JPRS 76844

19 November 1980

China Report

AGRICULTURE

No. 111

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available from Bell & Howell, Old Mansfield Road, Wooster, Ohio 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 76844

19 November 1980

CHINA REPORT

AGRICULTURE

No. 111

CONTENTS

I. GENERAL INFORMATION

BETTER FINANCIAL MANAGEMENT FOR STATE FARMS ADVOCATED

Beijing CAIZHENG [FINANCE] in Chinese No 5, 5 May 80 pp 1-4

[Article by Jiang Dongping [3068 2639 1627]: "Conscientiously Strengthen Management of Financial Affairs, Promote Farms, Reverse Losses, and Increase Profits"]

[Text] In paying the utmost attention to the development of state farms during the past year, the Party Central Committee and the State Council have provided a great deal of significant guidance and have requested state farms to perform independent accounting and assume sole responsibility for profits and losses. In December 1978, in the draft of the "Resolution of the CCP Central Committee Concerning Certain Problems Affecting Acceleration of Agricultural Development," passed by the Third Plenary Session of the 11th Party Central Committee, it was pointed out that farms which presently are still incurring losses must turn such losses into profits within a fixed period, and that prior to 1985, state farm profits need not be handed over to higher authorities. In order to implement the spirit of this resolution, the State Farms and Land Reclamation Main Bureau and the Ministry of Finance drafted the "Provisional Regulations Concerning the Practice of Assuming Responsibility for Financial Affairs by Farm and Reclamation Enterprises." This was reported to and approved by the State Council, and in February of this year it was promulgated to all locations for implementation as State Council Directive No 55 (1979). During the past year, the broad masses of cadres, staff and workers of the state farms, inspired by the spirit of the Third Plenary Session, carried out the Central Committee's "eight-character point policy" for readjustment of the domestic economy and the resolution for acceleration of farm development. By practicing the method of assuming responsibility for financial affairs, they realized gratifying accomplishments in increasing production while increasing revenues. In 1979, total output of grain by state farms nationwide [quanguo nongchang] reached 14.1 billion jin, an increase of 11 percent over last year. Total cotton output was 1.61 million dan, an 8-percent increase over last year. As for financial matters, there was an increase in the number of enterprises which made a profit, and a decrease in those which suffered loss. The profit-loss balance was in favor of profits in the amount of 200 million yuan, and a beginning was made in reversing the passive situation which had gone on for 13 years, wherein state farms continually suffered losses. Of course, the situation is not balanced regionally, and there are still losses in some districts.

This year 1980 is an important year for the readjustment of the domestic economy, with farms having quite favorable circumstances and, on the basis of accomplishments already realized, going a step farther in grasping well the changing of the points

of emphasis in their work, and carrying out the tasks of readjustment, restructuring, rectification and improvement [of agriculture]. They will thoroughly develop the movement to increase production while practicing economy. The state raised the purchase price of some agricultural byproducts, readjusted wages of some staff and workers and readjusted regional wage categories, and implemented grain allowances for staff and workers. All of these measures aroused the enthusiasm of the broad masses of staff and workers and promoted the reversing of losses and increasing of profits on the farms. This year, according to the state plan, the various production targets for state farms nationwide are being increased at a comparatively greater rate than last year's. In order to promote the realization of this plan and go a step farther in reversing losses while increasing profits, finance departments at various locations should exert their utmost efforts to act in conjunction with departments responsible for the work and conscientiously carry out the following several tasks:

I. Support farms in changing production conditions and use funds for the key link of increased production

Since the founding of the nation, there has been a great development of state farm and land reclamation enterprises. At the present time there are 2,714 state farms nationwide, with staff and workers numbering 5.06 million. There are 65 million mu of cultivated land area and more than 11 million mu of rubber, fruit and mulberry trees and tea. The farms possess 44,000 tractors, each of which has an average cultivation assignment of 1,432 mu; of this set criterion, 84 percent has already been completed. They possess 13,800 combines, each of which has an average cultivated land assignment of 4,565 mu; of this set criterion, 82 percent has already been completed. There are 17,000 agricultural vehicles, each of which has an average cultivated land assignment of 3,705 mu; of this set criterion, 94 percent has already been completed. Total mechanical motive power is 7.18 million horsepower, and the level of agricultural mechanization, a major project, has reached approximately 80 percent. For 30 years they have supplied the majority of grain and beans and other livestock products, making a positive contribution to the nation. The loss situation at present continues to be fairly serious, however, with the yield consistently fluctuating at around 200 jin per mu, and half of the enterprises are still suffering losses. This kind of circumstance is quite inappropriate for realizing the four modernizations.

There are many causes for the low production and losses of the farms, chief among which were the interference and damage wrought by the ultraleftist line of Lin Biao and the "gang of four." But looking at production conditions, it can be seen that another important cause is the small number of fields with high, stable yields. At present, state farms nationwide are attempting to ensuring stable yields despite drought or excessive rain, but there are only somewhat over 5 million mu of fields with high and stable yields, comprising only 8 percent of land under cultivation; this is far, far below the level of 22 percent reached by the rural people's commune and brigades nationwide. The grain production from the cultivated land in the Heilongjiang reclamation area comprises one-half of the total grain production from cultivated land on state farms nationwide. Although there has been an initial resolution of drainage problems in that area, and although agricultural mechanization has been basically realized, so that stable yields might be ensured despite drought or excessive rain, there are only somewhat more than 200,000 mu of fields with high,

stable yields, comprising less than 1 percent of the land under cultivation. Owing to poor water conservancy and irrigation conditions, production volume remains low and unstable, and the changing production situation during the past 10 years has shown this problem clearly. In 1967, each tractor was assigned the cultivation of 3,250 mu. Two jin and 8 liang of chemical fertilizer were applied on each mu of land and, due to good weather for the crops, production of grain and beans reached 226 jin per mu. In 1978, the cultivation assignment of each tractor had diminished to 2,693 mu, while the amount of chemical fertilizer applied to each mu increased to 22.5 jin. Due to continuous drought, the great majority of farmland had no water for irrigation, and production of grain and beans fell to 205 jin per mu. In summing up many years of practical production experience, they stated that the key link in realizing high and stable yields is resolving the drainage and irrigation of cultivated land. Wherever emphasis is placed on the problem of water conservancy and the task of water conservancy construction for farmland is taken in hand, the achievement of increased production and revenues is always realized. Presently many comrades have come to understand that the building of modernization by the farms not only requires mechanization, extensive use of agricultural chemicals and electrification, but also requires fields with high and stable yields and realization of water conservation.

The conditions are favorable for state farms [guoying nongchang] to carry out water conservation construction. Based on analysis of relevant data, most of our nation's farms are in hilly regions, near streams or adjacent to rivers or lakes, and water resources are abundant, although the present utilization rate is very low. For example, the total runoff [of water] in the Heilongjiang reclamation area is 15 billion cubic [meters], of which only 400 million cubic [meters] are used at present; thus, the utilization rate falls below 3 percent. In the Xinjiang reclamation area the total runoff is 90 billion cubic [meters], of which 8 billion cubic [meters] are used giving a utilization rate of less than 10 percent. Other areas are similar. In order to support farms in quickly changing production conditions, next year the state will arrange to give farms various fund allocations totaling approximately 1.1 billion yuan, of which 230 million will be paid out to small-type farms. Finance departments should assist farms in conscientiously managing and using these funds, arriving at an equitable distribution, and applying [the funds] at key points and guaranteeing success. They first of all should use the funds for supplementary construction and [water conservation] conveyance systems where results will be seen quickly with little cash outlay. As for farm units whose water conservancy conditions are poor, potential for increased production is great, and the spirit of self-reliance is strong, preferential arrangements should be made. We should build at a place and then put it right to use, so as to truly realize the utmost benefits.

To emphasize the problems of supporting farms in water conservancy construction and in managing and using well the funds for farmland water conservancy is to speak in terms of the general situation. But owing to the fact that the farms of our nation are spread over a very wide area, the natural conditions prevailing at various locations will differ widely, and they cannot all be "sliced with one knife." Each place must act according to the actual circumstances at its location, suit measures to local conditions in determining points of emphasis to be supported, and be practical and realistic in resolving the problem of increasing production and revenues.

II. Carry out a program of "one line of work the main concern but other lines carried on simultaneously," and accumulate funds for construction of modernization

In view of the experiences of many places, the farms must seriously implement the policy of "one line of work as the main concern, but engage in other lines," simultaneously grasp well the production of grain and cotton, suit measures to local conditions in developing forestry, animal husbandry and fisheries, moreover fully utilize local resources in establishing sideline occupations which require low capitalization and show quick results with large earnings and take the road of agricultural-industrial-commercial complexes. This is an important means by which production and revenues are increased and funds for modernization construction are raised.

In the 30 years since the founding of the nation, there has been a gradual development of farm-run sideline occupations accompanying the development of [state] farms and land reclamation. Nationwide, by the end of 1978 there were a total of 6,023 farm-run sideline occupations with 670,000 staff and workers in more than 20 industries such as farm implements, steel, cement, chemical fertilizer, and food processing. Annual production reached 3.5 billion yuan, which was 48.4 percent of the gross output value for the five occupations. Of this amount, profits comprised 540 million yuan. Owing to the development of farm-run sideline occupations, a group of farms with fairly high output values and profits has already emerged. For example, the gross output value of Lutai farm has reached 21 million yuan, of which sideline occupations accounted for 70 percent, or 14.7 million yuan. Total profits were 5 million yuan, of which sideline occupations accounted for 90 percent, or 4.5 million yuan.

Many farms engage in industry which is centered on agriculture, thus promoting the building of farm modernization. For example, at the Communist Youth Combined Reclamation and Cultivation Farm of Jiangxi, there are fewer than 2,000 staff and workers and fewer than 3,000 mu of cultivated land. In the past, under the "single operation" system, the grain yield was only somewhat over 200 jin per mu, and losses were suffered over a long period. Since 1973, while they were exerting great efforts to develop grain production, and zealously developing farm-run sideline occupations, their development of sideline occupations reversed and then promoted changes in agricultural production conditions and promoted increased grain production. This farm had a total production volume in 1979 of 4.1 million jin, of which more than 1 million jin were handed over to the state. At present many comrades believe that if a farm wants to proceed with building modernization and realize increased production and revenues, it is unsatisfactory not to positively develop farm-run sideline occupations.

For the past few years, although there has been fairly rapid development of farm-run sideline occupations nationwide, several problems remain. There are many comrades who, fearful of being criticized for "not engaging in a proper occupation," don't dare break out of the confines of "single operation," nor do they lift a hand to perform agricultural sideline [occupations]. Although the resources for developing sideline occupations are perfect, they don't dare use them. There are some places where the production program is not clear, the overall arrangement is not rational, enterprise management is confused, and losses and expenses are fairly great. Finance departments should act in cooperation with departments responsible for the

work, summarize experiences in developing farm-run sideline occupations, and eliminate the influence of the ultraleftist line. Moreover, they should conscientiously aid farms in resolving the following few problems:

1) Make a rational readjustment of the overall arrangement of sideline occupations. At present there are several places where the productive force of farm-run sideline occupations is incapable of effective development, owing to insufficiently rational overall arrangements. For example, in the Heilongjiang reclamation area there are seven chemical fertilizer plants whose designed annual production capability is 104,000 tons but which presently are producing only 48,000 tons. There are 16 agricultural implement plants whose annual production value could reach 80 million yuan; currently they are producing goods worth only 57 million yuan. There are 179 edible-oil processing plants whose annual processing capability is 600,000 tons; at present they are processing only 380,000 tons. There are other areas where similar circumstances prevail to varying degrees. The reason that production at these sideline occupations fails to reach designed capability is chiefly that some of them have been set up too close together and some lack the bare essentials. At present many places are carrying out rectification, and finance departments should assist responsible departments in formulating development plans, in making a rational readjustment of overall arrangements, and in implementing designated-site production. As for those enterprises whose supply of raw materials is not guaranteed, technology is not up to standard, products are unmarketable, and losses are serious, recommendations should be made that they halt production and give up. As for those enterprises whose supply of raw materials is guaranteed and whose production is needed, yet which are still temporarily suffering losses, a recommendation should be made that they halt production for a definite period while rectification is carried out.

2) Expand production of commodities. The majority of farms in our nation have comparatively abundant resources and production conditions for development of commodities. If the work is done well, it will be possible to effect high rates of increase in production value and profits. For example, resources for paper production are especially abundant and, in addition to raw materials in the form of a large amount of uncultivated plant life, approximately 5 million tons of wheat straw and rice straw can be produced annually. The farms can use approximately 2.5 million tons for paper production and still will have used only 5 percent. Currently state farms nationwide [quanguo nongchang] have a labor surplus of approximately 1 million-plus, along with several million dependents of staff and workers. If it would be possible to organize them in initiating multiline operations, developing production of sideline occupations, and tapping new production resources, then a solution would have been found for the labor surplus problem and revenues could be increased as well.

3) Provide needed support with respect to funding. In order to support the development of farm-run sideline occupations, the state has already appropriated 46 million yuan in loans for small-scale technological processes at farm-run sideline occupations. Results have been comparatively remarkable. However, management at some locations has been lax and the phenomena of nonreceipt and slow circulation [of loan money] are occurring. Henceforth, management should be strengthened and vigorous action should be taken to recover the funds, since the more received the more can be disbursed and circulation accelerated. In order to support development

of farm-run sideline occupations, Hunan Province even took part of the monies under provincial control for economic readjustment and appropriated them as circulating funds for farm-run sideline occupations--a move that was welcomed by the farms. Other provinces and regions could consider acting in a like manner at times when small loan quotas are insufficient. Circulating funds for farm-run sideline occupations should be disbursed to those units whose raw materials are guaranteed, for whose products there are markets, whose products can be produced very quickly, and whose level of accumulation [of capital] is comparatively great. This will be even more beneficial for supporting the development of farm-run sideline occupations.

III. Conscientiously implement the practice of assuming responsibility for financial affairs, and improve operational management

In view of the actual circumstances regarding state farms nationwide [quanguo nongchang] during the past year, the implementation of the practice of assuming responsibility for financial affairs to inspire the broad masses of staff and workers at the farms to consciously participate in enterprise management and to use economic methods to effect important measures at state farms [guoying nongchang] have been important elements in the expansion of enterprise autonomy and of the strict economic responsibility system. The initiative of the farms and of the broad staff and workers has truly been brought into play, the development of production has been promoted, and a reversal of losses with increased profits have been encouraged. Responses from various locations indicate that when responsibility for financial affairs is taken on, the previous situation, in which the farms were the same whether managed well or poorly, the same whether operated at a loss or a profit, and in which any losses would be made up, has been changed. It is a good method which combines rights with responsibilities and makes a clear distinction between rewards and punishment. However, owing to the fact that it has been in effect throughout the country less than a year, there are some problems still requiring study and attempts to find solutions under practical conditions. It is hoped that finance departments in various locations will conscientiously sum up experiences so as to further this method along toward perfection. At this time they should pay attention to successfully resolving the following few problems:

1) Provinces and regions should keep a fixed amount of reserves. Our nation is very large, and each year several localities suffer calamities. For example, one province might have regional disasters which occur with varying degrees of severity. The distribution of our farms is very broad, and calamities occur frequently. When arrangements are being made for assumption of specific responsibilities, the situation as a whole must be discussed before it is possible to have "preparedness for averting perils." In order to resolve this problem, the practice of assuming responsibility for financial affairs has stipulated that each province, municipality, and autonomous region will set aside a fixed amount of reserves when arranging quotas for assumption of profit-loss responsibility. These will constitute mandatory reserves of circulating funds for economic readjustment. Last year, however, several provinces and regions did not keep any reserves. It is recommended that this year, when the various provinces, municipalities, and autonomous regions arrange quotas for subordinates, around 15 percent be kept strictly as reserves.

2) Quotas for assumption of responsibility should be put into effect, echelon by echelon. The practice of assuming responsibility for financial affairs stipulates

that prior to 1985, the state will, for state farms [guoying nongchang] and pastures, implement independent accounting in general, self-responsibility for profits and losses, retention of profits for use, and nonreimbursement for losses. For rubber plantations, industries directly subordinate to farm and reclamation departments at various levels, supply and marketing enterprises, and a small number of state farms and pastures whose profits are comparatively large, the state will assume the responsibility for turning over profits to the state. For a small number of state farms and pastures where natural conditions are too deficient and where losses are still being temporarily incurred, the state will, at its discretion, pay compensation during the first or second years in fixed amounts. However, some places speak only of keeping profits for their own use and not of no reimbursement for losses; regardless of the kind of enterprise, these places want to retain their profits, no matter how great, and want the state to reimburse them for any losses which might occur--and never mind asking the reason for those losses. This actually means "enterprises assuming responsibility for profits, and the state assuming responsibility for losses." If this state of affairs does not change, the enterprise economic responsibility system will be weakened in the future. So that the farms will have clearly defined objectives for struggle, each place should determine at the earliest date which enterprises will bear sole responsibility for profits and losses, which will assume responsibility for turning profits over to the state, and which will temporarily receive a fixed compensation. It is mandatory that a set period be established within which losses are to be turned into profits; this will facilitate their adopting effective measures and striving hard to achieve and surpass their missions.

3) Arrangements should be made for proper utilization of and responsibility for surplus cash. Last year the majority of the farms exceeded the requirements of their missions for assuming responsibility for financial affairs; they were able to assume responsibility for surplus cash in the amount of 350 million yuan. In utilizing these funds, adherence should be made to the principle of "proposals first, then expenditure," and there must not be "anticipation of future income." Most important is the use of these monies as production development funds, applied toward technological production processes. Part of these monies can be used as a fund for awards for staff and workers and for setting up collective welfare facilities and bonus payments. At the same time, it is necessary to set aside a suitable reserve fund for use in making up deficiencies with surpluses. This reserve must be set aside. As to which of the three types of funds is to constitute the largest proportionally, it is hoped that each location will hold discussions on its own and make this determination, based on the overall situation locally. Regarding the situation of assuming responsibility for utilization of surplus cash, finance departments should proceed with the necessary leadership and supervision.

4) A further step should be taken to improve operational management. The practice of assuming responsibility for financial affairs sets forth the following: "The key link in determining whether or not responsibility can be borne for financial affairs is the leadership of the party committees and the making of major efforts for carrying our production and improving operational management." For the past year, under the leadership of party committees at various levels, the majority of farms have realized great achievements in the areas of production development and improved operational management. However, there are still a small number of units which do not care about economic accounting, whose operational management is fairly confused, and whose losses and expenditures are fairly serious. Finance departments should take the initiative to help farms adopt effective measures; open up widespread accounting by teams; strictly control wages, materials, and various types of expenditures; reduce payments not of a production nature; and vigorously lower prices. If prices can be reduced by 3 percent for each 100 yuan of production value, state farms nationwide [quanguo nongchang] can save more than 200 million yuan. If our work is done well, state farms nationwide this year will be able to achieve even better results in management.

NEW HIGH-YIELD WINTER WHEAT VARIETY TESTS WELL

Beijing RENMIN RIBAO in Chinese 22 Aug 80 p 2

[Article by Li Dengchun [2621 4098 2504] and Li Chunhua [2621 2504 5478] of the Crop Institute of the Chinese Agricultural Science Academy: "A New Variety of High-Yielding Winter Wheat--'Jian-26'"]

[Text] "Jian-26" is a new winter wheat variety successfully bred by the Chinese Agricultural Science Academy's Crop Institute in 1976. In recent years it has demonstrated resistance to lodging and disease, good yellowing, and high yields in variety comparison tests, regional experiments, large area demonstrations, and inoculation evaluations. It has won the attention of agricultural production departments and has been included as a demonstration variety for popularization by the Agriculture Ministry.

This variety has larger rectangular spikes, the awns are long, the husks are white, and the grains are red. Each spike has 30 to 40 grains. The plant is shorter than 100 centimeters. The stem is pliable and strong and is highly resistant to lodging. Its protein content is about 13 percent. Its heading time is 1 or 2 days earlier than the control variety "nongda 139." The Chinese Agricultural Science Academy tested the grown plants in a variety comparison test in 1979, and its inoculation was evaluated in a regional experiment in Beijing municipality. Both [tests] showed that the variety is immune to tiaozhong 19 and tiaozhong 20 physiological forms of stripe rust disease, is slightly susceptible to the tiaozhong 17, tiaozhong 18, and tiaozhong 21 physiological forms of stripe rust disease, and is relatively resistant to leaf rust disease.

"Jian-26" manifested safe wintering and a higher yield than the control variety in the 1976-1977 cold damage experiment. In 1978, the variety led others in comparison tests of high-fertilization varieties conducted by the Agricultural Science Academy. The Zhaogezhuang Brigade of Xiji Commune in Tongxian planted it sparsely sown on 1 mu of an experimental field. Some 70,000 basic seedlings were planted. Each mu produced 430,000 spikes, each spike had 39 grains, the thousand grain weight was 39.4 grams, the yield was 1,051 jin per mu, and the potential for increased yield was great. In 1979, it took first place in the joint regional experiment of the high fertilization group in Beijing Municipality; the unit yield ranged from 514 to 691.6 jin. In the same year, Chengguan Commune in Tongxian planted 20 mu of this variety, and the average per mu yield was 751 jin. This variety performed well even under severe cold and low temperature conditions that lasted from last winter to this spring. At the Xiguan Brigade in Changping County the average yield was 650 jin per mu. At the Langfang Regional Agricultural School in Hebei, the per mu yield was 780 jin (Note: This year in the Beijing area, the yield of wheat generally dropped about 30 percent because of autumn drought and winter cold). It is estimated that this variety can be sown on about 100,000 mu of land this autumn in the Beijing suburbs. This variety is also suited for planting in wheatfields that have above-average fertility in the north-central part of Hebei Province and the central and southeastern parts of Shanxi Province.

9296
CSO: 4007

NEW COTTON VARIETIES SUQI NO 1, ZHENGMIAN NO 1 INTRODUCED

Beijing NONGYE KEJI TONGXUN [AGRICULTURAL SCIENCE AND TECHNOLOGY NEWSLETTER] in Chinese No 1, 15 Jan 80 p 21

[Article by Yuan Yibao [5913 5030 1405] of the Jiangsu Provincial Qidong County Seed Company and Huang Chunsheng [7806 2504 3932] of the Hebei Provincial Zhengding County Seed Company: "Introduction to New Cotton Varieties; Suqi No 1, Zhengmian No 1"]

[Text] Suqi No 1 is a variety systematically and selectively bred from the Jiangsu mian 203 by the May 7 Farm of Qidong County in Jiangsu Province. The farm test planted Jiangsu mian 203 in 1971, and at the same time, selected superior single plants and planted them in rows in the nursery the second year. At the end of the year, they were moved to Hainan Island for propagation in nurseries for plant lines. In the third year they were planted in original variety nurseries to produce original varieties. Through test planting, the variety yielded large cotton bolls, high yields and good quality. In 1976, it was named the 203 superior line by the county's bureau of agriculture as a successor variety for popularization. Purification and restoration work began and in 1978 by mutual agreement between the provincial and regional agricultural departments, it was named Suqi No 1.

Characteristics: The plant type is clustered, the stem is thick and strong, the leaves are small, the grooves are deeper, the leaves are lighter in color (during the seedling and flower bud periods, the leaves are yellowish green). The boll is oval in shape, the single boll weighs about 5.5 grams. The surface of the boll is smooth, the stem of the boll is long, the down is 30 to 31 millimeters long, the cloth content is about 41 percent. The seed index is 10 grams, and the cloth index is 7 grams. It is a slightly early medium maturing dryland cotton variety. Its growth period is about 120 days. It is suitable for companion planting with wheat. Germination is earlier than that of Delta Pine cotton No 15 by 3 to 4 days. The pericarp of the cotton boll is thin and the boll opens easily. However, during the latter period, growth is weak. When high temperatures and dryness are encountered during the flowering and boll forming period, timely application of fertilizers and irrigation are needed to prevent the yield and quality from being affected.

Bumper harvests and superior quality: The farm test planted this variety in 1973 and 1974. The weight of the single boll was heavier than that of Delta Pine cotton No 15 by 0.3 to 0.5 grams, the cloth content was higher by 0.5 to 1.7 percent, the length of the fibers was over 30 millimeters, and the increase in yield

was from 6.7 to 15.4 percent. In 1975, it was planted at four production teams for comparison with Delta Pine cotton No 15 planted at four neighboring production teams. Suqi No 1 produced a per mu increase of 12.22 percent in yield. The cloth content was higher by 0.24 percent, the length of the down was longer by 0.77 millimeters, the number of first to third grade flowers was higher by 8.2 percent, and the unit price for seed cotton (dan) was more by 2.16 yuan. In 1978, 87,200 mu were planted throughout the county. We surveyed 26 production teams in four communes. Suqi No 1 produced a per mu increase of 11.76 percent more than Delta Pine cotton. The percentage of cloth content was higher by 2.4 percent, the length of down was longer by 0.2 millimeters, and the unit price of seed cotton increased 3.67 yuan. The cotton farmers at each locality were pleased. In 1979, over 430,000 mu were planted throughout the county.

Quality of fibers: In 1975, the Third Cotton Weaving Plant of Nantong in Jiangsu Province evaluated the fibers of Suqi No 1 and concluded that the length of the fibers, the strength of the single fiber and the maturity of the fiber and such major indicators were all superior than those of Delta Pine Cotton No 15.

Key Measures of Cultivation: The growth trend of Suqi No 1 during the seedling and flower bud periods is strong, but the color of the leaves is relatively light. Therefore, fertilizers for the seedlings must be lightly applied and fertilizers for the flower buds must be strategically applied, mainly using organic fertilizers. Because the variety has a stronger boll forming characteristic, and the emergence of the flower buds and flowering are more concentrated, therefore management of fertilization and irrigation during the flower boll period must be intensified. Application of fertilizers for the flower bolls should be earlier than that for Delta Pine Cotton by 3 to 5 days. During the latter period of growth, the growth trend is weak, and the plants easily withers, thus topping fertilizers should be applied well according to the conditions of the seedlings. When it is dry, sufficient water must be sprayed to facilitate the increase of the bolls of the upper part and to develop the potential of the superior variety to produce increased yields.

The science and technology group of the Anxia Brigade of Zhengding County in Hebei Province selected eight superior variant single plants of bare leaf Delta cotton in 1969 and after years of selective breeding, selected the Zi xuan No 3 in 1972. In 1977, it was officially named Zheng mian No 1 by the county committee of Zhengding County.

Characteristics: The plant type is loose, the plant height is 90 to 100 centimeters. The stem is thick and strong and has a small amount of down. The first fruiting branch grows between the 6th and the 8th nodes. The fruiting branches at the bottom part are shorter, and fruiting nodes are distributed evenly. The leaf is medium and slightly small, light permeability is good, the leaves are light green during the early growth period and deep green during the latter growth period. Growth is prosperous during the middle and latter growth periods. More bolls are formed on the middle and upper parts. The boll is egg shaped, larger, most of the bolls have four capsules. The single boll weighs 5.5 grams. The pericarp of the cotton boll is smooth and thin, and it constitutes about 24.7 percent of the total weight of the boll. The tip of the boll has a shallow opening, the stem of the boll is relatively short and thick. The crown of the flower is larger, the pollen is yellow and developed. The stigma of the pistil is relatively

long, longer than the stamen by 3 to 5 millimeters. The bolls open easily and are concentrated. The cotton is easily picked. The cloth content is about 40 percent, the length of the down is about 31 millimeters, the color of the ginned cotton is white and silky, the fibers are uniform, and quality is good. The seed index is 11 grams and the cloth index is 7 grams. There are few bearing seeds and nonbearing seeds. Each capsule bears an average of 7.14 seeds, the percentage of sterile seeds is 3.1 percent, or 0.23 percent by weight, less than that of Delta Cotton No 16. The seeds are grayish white. The growth period is 140 to 145 days, and it is a medium maturing variety. The time from the emergence of flower bud to flowering lasts 25.7 days, flowering to opening of the boll lasts 62.4 days. It has a strong adaptability and resistance to adversity. Over the years, the cloth content and the length of the down have all remained relatively stable and the variety is tolerant to verticillium wilt.

Its boll forming characteristic is slightly poorer and the plants easily grow profusely when heavy rain falls during the bud and flower periods. The flesh of the leaves is relatively thin and resistance to aphids and spider mite is poor.

Yields: Since 1971, it has been compared to 78 varieties or new lines in the province and elsewhere. Its yield of ginned cotton has always been high. Beginning in 1976, it was part of the cotton regional experiment in Hebei Province for 3 years, and the per mu yield of ginned cotton was always the highest. Compared to the original control variety, Ji han No 5, it produced an increase of 11.9 percent in yield the first year, 6.3 percent increase in yield the second year, 23.1 percent increase in yield the third year, and the 3-year average increase was 13.8 percent. Beginning in 1977, it was part of the regional experiment of varieties resistant to verticillium wilt in Hebei Province for 2 years. In the first year the yield of ginned cotton was 124.4 jin, an increase of 14.6 percent in yield over that of the control Delta No 16 and was the highest of the 10 varieties tested. In the second year its average per mu yield of ginned cotton was 111.7 jin, an increase of 37.6 percent in yield, the second highest among the five varieties and lines. The 2-year average increase in yield was 26.7 percent. Beginning in 1977, it was part of the regional experiment of cotton varieties in the Huang Jiang valley for 2 years. The results of the comprehensive experiments of 35 test points showed an average per mu yield of 154.6 jin, an average increase of 27.9 percent in yield over that of the original control varieties Xuzhou 1818, Jingan Delta 15, and Shaan 401, or the second highest. The highest yield was realized in 1978 at the Shaanxi Dali Farm. The per mu yield of ginned cotton was 285.9 jin. In 1978, in the regional experiment of cotton varieties in the Yuncheng region in Shanxi, the yields at eight test points averaged a per mu yield of 207.7 jin of ginned cotton, an increase of 31.5 percent in yield over the control Delta No 16, first among the 11 new varieties.

Key Measures of Cultivation:

The variety was cultivated in relatively infertile soil and it is more tolerant to infertility. It can be planted in fields of ordinary fertility. The plants grow more prosperously after emergence of the flower bud. Its boll forming characteristic is strong. Opening of the boll is concentrated. It matures relatively early. Therefore, after the emergence of flower buds, attention must be paid to deep intertilling to prevent profuse growth. Sidedressings should be applied appropriately early and topping fertilizers should be applied early, and the branches should be trimmed early so that more bolls will form during the flowering period.

Seedlings should not be planted too densely (this variety's plant type is relatively tall), generally it is better to plant 5,000 plants per mu. The row distance should be appropriately widened to facilitate permeation of wind and light. During the seedling period the color of the leaves is relatively light and photosynthesis is weak. Fertilizers for the seedlings can be appropriately applied. But an over abundance of nitrogen fertilizers during the growth period of cotton will cause the cloth content to drop, therefore, the standard for fertilization is 50 jin per mu (not including base manure), but not too much. The variety's leaves are thin, its resistance to cotton aphids and spider mite is relatively poor and attention must be paid to their prevention and control in time.

9296
CSO: 4007

SOYBEAN VARIETIES HEI NONG 16, HEI NONG 26 INTRODUCED

Beijing NONGYE KEJI TONGXUN [AGRICULTURAL SCIENCE AND TECHNOLOGY NEWSLETTER] in Chinese No 1, 15 Jan 80 p 20

[Article by the Soybean Research Institute of the Heilongjiang Academy of Agricultural Sciences: "Soybean Varieties Hei Nong 16, Hei Nong 26"]

[Text] Hei Nong 16

Origin of the Variety

Our institute's breeding group used gamma rays of 10,000 roentgens of cobalt^{60} to treat the second generation offspring of the hybrid of Wu ding zhu as female parent and Jing shan bu as male parent and bred Hei nong 16 from a selection of single plants. In spring of 1971, it was reviewed at the conference of regional experiments in Heilongjiang Province and chosen for popularization in the Songhuajiang region, Suihua region and the Mudanjiang region.

Characteristics

The plant height is 80 to 90 centimeters. The plant has two to three branches, the main stem is developed, the plant type is clustered, the internodes are short, and there are more nodes. The distribution of pods on the main stem and the branches is even, three to four pods grow on each node, and there are many pods with three to four beans. The flowers are white, the leaves are lanceolate, the down is grayish white. It has a habit of unlimited formation of pods. The seeds are nearly round, the seed coat is yellow, shiny, the mealy part is light brown, the weight of 100 beans is 18 to 20 grams, the quality is superior. Oil content is 22.64 percent and the protein content is 36.85 percent. The medium maturing variety requires 120 days from the time of budding to maturation. The stem is strong, has elasticity, and does not lodge. It has a stronger resistance to aridity, it is tolerant to mild salinity and alkalinity and its adaptability is wide. Its requirement for soil fertility is not strict. It possesses a definite tolerance to shade, it is suitable for interplanting with corn. Its plants are tall, its stems are strong and do not lodge. Pods are formed densely, and its yield is higher than other varieties. From 1968 to 1970, it was tested in regional experiments at 36 localities including experimental stations of key farms and in the Songhuajiang and Suihua regions. Average per mu yield was 285.2 jin, the highest per mu yield was 491.7 jin, averaging an increased yield of 11.3 percent over the control varieties Dong nong No 4 and Hei nong No 5. In 3 years under different climatic conditions, it produced increased yields in all cases.

In 1975, the first production team of the 51 Brigade of Xinhua Commune in Suihua County planted 105 mu and the average per mu yield was 431 jin. In 1973 and 1974, the agricultural science institute of the Songhuajiang region organized seven liaison points and conducted an experiment of interplanting 36 varieties of soybeans with corn. At seven test points, the yield of Hei nong 16 variety interplanted with corn in a 6:6 ratio produced one of the three highest yields, averaging a per mu yield of 295.2 jin.

Key Point of Cultivation

It is suitable for planting in the central and southern regions of Heilongjiang Province. It is also suitable for planting in slightly alkaline and saline regions in Anda County. Up to 1978, the planting area has reached over 2,500,000 mu. The number of seedlings preserved per mu was 16,000 to 18,000 plants. For cleaning seeds in fertile fields, the number of seedlings preserved per mu was 16,000 plants. For cleaning seeds in medium fertile soil, the number of seedlings preserved per mu should be 20,000 plants.

Hei Nong 26

Origin of Variety

Our institute's breeding group bred this variety from Ha 63-2294 which is an early maturing mutant from radiation treatment used as the female parent and the subvariety Xiao jin huang No 1 of limited pod forming habit as the male parent in 1965. In the spring of 1975, it was chosen at the conference of regional experiments in Heilongjiang Province for popularization in the Songhuajiang region.

Characteristics

The plant is tall and large, the plant height is generally 90 to 110 centimeters, branches are few and there are many nodes on the main stem. Pods are concentrated on the main stem, there are many pods with three to four beans and the percentage of pods with four beans is high. The leaves are lanceolate, relatively narrow and small, and the angle between the stems of the leaves and the main stem is relatively small. During the latter period of growth, permeation by wind and light is good. It is suitable for dense planting and machine harvesting. The down is grayish white. It possesses the character of unlimited pod forming. The pods are dense. The seeds are nearly round. The seed coat is deep yellow and shiny. The mealy part is yellow. The weight of 100 beans is 17 to 18 grams. The percentage of beans being consumed by insects is low. The beans are only slightly affected by disease. The quality is superior, the oil content is 21.6 percent and the protein content is 40.83 percent. The medium maturing variety requires 124 days from the time of budding to maturation. It is strongly tolerant to fertilizers, the stem is strong and does not lodge. It possesses characteristics of stable yields and bumper harvests. From 1972 to 1974, it was tested in the regional experiment at 49 test points in 11 counties in the Songhuajiang region. Average per mu yield was 320.2 jin, the highest per mu yield was 483.3 jin, an average increase of 8.7 percent in yield over that of the control Hei nong No 10 variety. Between 1973 and 1974, it was planted in large areas in the production experiment in the Songhuajiang region. It produced increased yields at all places over the presently

available superior varieties, the scope of increase was from 8.8 to 21.1 percent, averaging an increased yield of 14.1 percent. In 1975, the Xinjian Brigade of Acheng County planted 2 mu and the per mu yield was 484.8 jin. In 1976, our academy's atomic energy laboratory conducted four experiments and in every experiment the per mu yield was 498 jin. This variety has a greater potential for producing increased yields.

Key Points of Cultivation

It is suitable for planting in the central and southern regions of Heilongjiang Province. The planting area can reach above 2 million mu. This variety is hydrophilous and is tolerant to fertilizers. It can produce remarkably increased yields in fertile land. In fields of ordinary fertility, it can yield more than other varieties. The planting density should be 18,000 to 20,000 plants per mu. It should be planted less densely in fertile fields and more densely in infertile fields. The sowing time should be between the last 10 days of April and the first 10 days of May. The fields should be irrigated when the weather is dry and arid.

9296
CSO: 4007

HYBRID RICE POTENTIAL FOR INCREASED YIELDS DISCUSSED

Fuzhou FUJIAN NONGYE KEJI [FUJIAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 1, 10 Feb 80 pp 8-10

[Article by Wu Zhiqiang [0702 1807 1730], Wu Tiansong [0702 1131 6623], and Liang Yiyuan [2733 0308 0337]: "Potential for Increased Yields as Determined From the Growth Characteristics of Hybrid Rice"]

[Text] A hybrid rice whose cultivation is spread rapidly, that is broad gauge, and that shows greatly increased output is a rarity in the history of the spread of cultivation of superior varieties. In 1978, the spread in hybrid rice cultivation over 8 million mu throughout the province brought increased yields of 700 million jin. In 1979, this was again expanded to 9.5 million mu with maximum per mu yields of 1600 jin. This represented a general 20 to 30 percent increased output over conventional rice, and as much as a 10-fold increase in output. Experience has brought realization of a truth, namely, that only by planting hybrid rice in accordance with its characteristics can its full potential be derived and its output be increased.

Hybrid rice manifests three major characteristics in its growth, namely tillering heterosis, root system heterosis, and panicle and grain heterosis. If the laws and conditions that bring about these heteroses are clearly understood and ways found to satisfy the conditions, it becomes possible to take full advantage of the heteroses and reap high yields.

Tillering Characteristics

The tillering and growth of stems and leaves on hybrid rice is more vigorous than on conventional rice. We surveyed the relationship between effective panicles and output for late season hybrid rice in 11 counties in 6 prefectures throughout Fujian Province. We found that for per mu yields of less than 500 jin, effective panicles numbered between 100,000 and 120,000, with only 90,000 in some cases. For per mu yields of 700 to 800 jin, effective panicles numbered 150,000 to 160,000. For per mu yields of 900 to 1000 jin, effective panicles numbered between 180,000 to 190,000. For per mu yields of 1300 to 1600 jin, effective panicles numbered between 200,000 and 230,000. The greater the number of effective panicles, the higher the output, and the smaller the number of effective panicles, the lower the output. There was not, however, any positive correlation between tillering and effective panicles. In some cases, tillers were numerous yet effective panicles were not. In other cases,

tillers were numerous yet effective panicles were not. In other cases, though the total number of tillers was not large, the panicle formation rate was high and the effective panicles numerous. Therefore, mastery of the laws governing tillering characteristics and tillering that produces panicles in hybrid rice is extremely important. Observation was conducted on the tillering characteristics of Siyou No 2, the results of which show that in composition of output, 85 percent of the tillers had panicles. These tillers grew out of the second to the tenth nodes on the main stem. The panicle formation rate from the first tillering was highest, standing at 98 percent. The first tillers from the second to the ninth nodes all formed panicles. The first tillers from the tenth node all failed to form panicles. The rate of panicle formation from the second tillering amounted to only 40 percent. The second tillers from the second to the fifth nodes formed panicles. In the second tillering, growth from above the fifth node failed to form panicles. The third and subsequent tillerings failed to produce panicles. Therefore, it is necessary for the sake of output to promote first tillering from the second to the ninth nodes and from the second to the fifth nodes during the second tillering, and to restrain the tenth node during the first tillering, all nodes above the fifth one during the second tillering, and the growth of tillers from all nodes during the third tillering. This will promote tillering from the lower nodes during the early stages and restrain tillering from the higher nodes during the later stages.

Tillering of hybrid rice consists of tillering in the seedling beds and tillering in the fields. Results of study of the quality of seedlings show that from transplantings of clumps of health rice seedlings containing two single stemmed seedlings each, with applications of 28 jin per mu of nitrogenous fertilizer, per mu yields were 853.3 jin. For every clump containing a single three-forked seedling, with application of 14 jin per mu of nitrogenous fertilizer, per mu yields were 850 jin. For every clump containing three single stem healthy rice seedlings, with application of 28 jin per mu of nitrogenous fertilizer, yields were 778.1 jin per mu. For every clump containing one seedling with two forks, application of 14 jin per mu of fertilizers produced per mu yields of 750.3 jin. This shows that between one and two times the number of seedlings must be used and as much as 10 times as much nitrogenous fertilizer must be applied if transplanted seedlings have not tillered in the seedbeds, and output will still not be much more than from tillered seedlings. A look at the factors structuring output shows that effective panicles from single seedlings with two forks when 14 jin of nitrogenous fertilizer per mu had been applied were only 68.12 percent that of three-forked seedlings to which nitrogenous fertilizer was applied at the rate of 28 jin per mu, while the number of grains per panicle was 150 percent. Study of the rice plants at harvest time revealed that panicles on tillers formed at the second and third nodes of seedlings have three forks accounted for 49 percent of total output. These panicles were larger than panicles formed from tillers at any other node position. This shows that numerous forks on the seedlings of hybrid rice function to conserve seeds, conserve fertilizer, and produce large panicles with increased output. This is the primary characteristic of hybrid rice. Cultivation for production requires the sowing of seeds at the proper time, sparse sowing of seeds, heavy applications of fertilizer, and meticulous care. Generally speaking, in field tillering [as distinct from tillering in seedling beds], the largest panicles and the greatest number of grains derive from tillers from the lower nodes. In the case of single stem seedlings of Siyou No 2, following transplantation of the seedlings to fields, grain output from effective tillers that grew from the fifth, sixth, and seventh nodes amounted to 62 percent of

total output. This is the tillering heterosis in the fields. The size of panicles on tillers is closely related to nutritional conditions. Experiments revealed that the panicles on tillers from the seventh node were largest, the reason being that tillering from the seventh node takes place following the first application of a top dressing of fertilizer. In high output fields with yields of 1500-1600 jin per mu, fertilizer was both adequate and available to the plants at all times, and panicles were large and even in height throughout the fields. The panicle formation rate on tillers is related to carbon nutrients. Observations conducted during the jointing stage showed that there was effective tillering above three leaves. When great closing of rows occurs too early in advance of the booting stage, some of the tillers will die. This is because they receive little sunlight and the products of photosynthesis are inadequate because the tillers above three leaves are unable to get sufficient carbon nutrients. This suggests to us that in order to increase the tillering and panicle formation rate of hybrid rice, in addition to growing sturdy seedlings with numerous forks, making shallow transplantation, using shallow water on the paddies, providing heavy applications of tillering fertilizer, and restraining ineffective tillers, it is also necessary to practice reasonably close planting, and to have reasonable norms for transplanting. In the width of rows, wide rows with narrow plants help produce sufficient tillers without closing the rows, thereby increasing the tillering and panicle formation rate. Results of experiments conducted to compare hybrid combinations and their response to fertilizer and closeness showed the tillering and panicle formation rate to be highest from a (8 + 4) x 5 cun arrangement. The ratio of panicle heterosis to plants was greatest; growth of leaves, sheaths, stems, and panicles was coordinated. The turning of dry stem and sheath material following panicle formation is proper, the photosynthesis rate high, and the number of green leaves retained through the stage of completion of ripening are numerous. The root system retains vitality for a long time and output is remarkably higher than from the 6 x 5 cun or 5 x 3 cun arrangement. Scientific application of fertilizer according to the tillering characteristics both promotes tillering and protects tillers. Tillering fertilizer may be combined with differentiation fertilizer in a single application following baking of the fields and re-covering with water.

Root Heterosis

Root development of hybrid rice is manifested in quantity and quality heteroses. Our research shows that the number of roots, the thickness of roots, and the dry weight of the root system of hybrid rice are all greater than for either conventional Hong 410 variety, with its large number of panicles, or the shortstemmed large panicle type, Dajiahuo, and that both strength of root formation and the vitality of the root system are greater. Furthermore, floating roots are well developed.

The root quantity and quality heteroses are manifested not only during the early stage of growth, but are reflected, more importantly, during the late stage of growth. The dry weight of roots is greatest during the ripening stage; strength in root formation continues into the early booting stage, and the vitality of the root system reaches its zenith during the ripening stage. Floating roots begin to develop from the main stem at leaf age 11 and continue until the ripening stage. The roots of Siyou No 2 and Shanyou No 3 had five secondary roots while Hong 410 and Dajiahuo had only two or three secondary roots. The absorption capacity of the

floating roots is several times greater than that of rice roots in general. This has a lot to do with the tremendous tillering, panicle formation, and fruiting rate. The root heterosis is also manifested in the upper and lower levels of the cultivated layer of high yield fields when the fields are covered with a layer of water during the early stage, when the fields are sunned at mid-stage, and in the moistness of the fields during the late stage. At harvest time, 97.39 percent of the dry weight of the root system came from roots at from 0 to 20 centimeters down in the cultivated layer of soil, and all these roots were old, dark brown ones. Roots at from 20 to 40 centimeters down amounted to 2.61 percent of the total, and they were all white roots with great vitality. The root heterosis was formed in excellent soil conditions where there was reasonably close planting, and scientific watering and fertilizing. Their formation assured that heteroses in tillering and in panicle and grain formation could proceed to their fullest extent.

Development of the root system in hybrid rice is intimately related to scientific fertilization. A look at the production over large areas in our province shows that where per unit yields of hybrid rice were not high, more fertilizer was used than for conventional varieties. That the quantity of fertilizer applied to high yield fields was higher than the results determined by the Hunan Agricultural Institute may be because some fertilizer was not absorbed. The amount of potassium fertilizer needed by hybrid rice was also greater than for conventional rice. Both conclusions were unanimous on this point. As for the fertilizer absorption during various stages of growth, reports from bumper harvest fields in Fujian Province and from the Hunan Pedology Institute were fundamentally the same. Absorption of nitrogen, phosphorous, and potassium from sprouting to tillering was 36.56 percent, 18.10 percent, and 27.60 percent respectively. Absorption from the time of early heading until completion of heading was 38.82 percent, 53.70 percent, and 52.90 percent respectively. From the time of full heading until full ripening, it was 24.62 percent, 28.20 percent, and 19.50 percent respectively. Following heading, about one-fourth of the available fertilizer remained to be absorbed, and this was of major significance in boosting both the fruiting rate and the per thousand weight of grains.

Panicle and Grain Development

The hybrid rice had large panicles and numerous grains. The number of grains formed per panicle totaled more than 100, in general, with many yielding from 200 to 300 grains, which reflects a heterosis in panicles and grain. Nevertheless, a fruiting rate that is not high is its shortcoming.

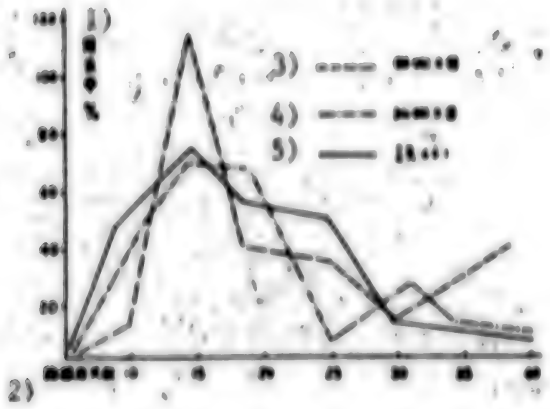
The hybrid rice's tillering was strong; stems and leaves grew vigorously, the efficiency of photosynthesis was high; and there was a large accumulation of dry material. As a result, panicles were large and spikelets numerous. Microscopic examination showed that during the late stage of spikelet differentiation in Shanyou No 3, the number of spikelets per panicle averaged 310, while they numbered only 204 in the restorer line, IR_{661}.

Spikelets per panicle were 51.8 percent more numerous in Shanyou No 3 than in IR_{661}. During the period of panicle formation, the number of spikelets declined, with only 212 per panicle occurring in Shanyou No 3, which has more than most. At harvest time the number of grains set were less. Shanyou No 3 had 140 grains.

Both the degeneration rate and the empty grain rate for Shanyou No 3 was higher, on average, than for IR_{661}. There were two reasons. One was incorrect introduction of nutrients. Nanyou No 3 has strong photosynthetic powers from the time of sprouting until the differentiation of young panicles, which is manifested in a daily accumulation of dry material that is 234 percent that of IR_{26} to pave the way for the development of panicles during the mid-stage and to form the heterosis of large panicles and numerous spikelets. During the mid and late stages, the photosynthetic powers of Nanyou No 3 gradually decline. The daily accumulation of dry material from full heading until full maturity amounts to only 98 percent that of IR_{26}. This results in the vieing of one branch with another and one spikelet with another at the time of the Spring Equinox. This is the main reason for the high degeneration rate for spikelets and the low fruiting rate in hybrid rice. Following completion of heading, the effective rate of photosynthesis and the darkness or lightness of leaf color has a lot to do with the number of green leaves at the time of harvest, and this has a lot to do with late stage applications of fertilizer in turn. In high yield fields in our province where per unit yields of between 1500 and 1600 jin of hybrid rice were obtained and where the fruiting rate was between 91 and 92 percent, it was close attention to mid and late stage top dressings of fertilizer to preserve the green color of the final leaves that brought these results. When color of leaves fades or an early shriveling of the leaves takes place during the late stage, the fruiting rate may decline by as much as 50 to 60 percent. The second reason was related to climatic conditions. Flowering and fruiting of hybrid rice is quite sensitive to temperatures. The period for panicle formation and flowering for Siyou No 2 had maximum daily temperatures of from 35 to 30°C and the fruiting rate was only 59.5 percent. Mid season and late season hybrid rices flower in higher temperatures, which results in a high empty grain rate. If temperatures are low during flowering, averaging below 23°C, the empty grain rate will also be high, which will mean a reduced output, or there will be no panicle formation, which will mean an aborted harvest. This shows that the sensitivity of hybrid rice to low temperatures is greater than that of conventional rice. Average daily temperatures of from 23 to 37°C (with maximum daily temperature not exceeding 35°C) are safe ones for the full heading period. Consequently mastery over the sowing and transplanting periods is strictly necessary.

Hybrid rice has a long period of maturation with two high points of being in the milk. For Siyou No 2, the first high point of being in the milk comes 15 days following heading, and the second comes 35 days after heading. For Shanyou No 3, it is 15 and 30 days respectively. As a result, the harvesting of hybrid rice must be done when it is totally ripe.

In summary, in hybrid rice, the tillering heterosis is fundamental; the panicle and grain heterosis is the goal, and the root heterosis is the assurance. The relationship among the three is extremely close. Only when full advantage is made of the tillering heterosis, the root heterosis, and the panicle and grain heterosis is it possible to have numerous panicles, large panicles, a high fruiting rate, large and heavy grains, and a bumper harvest.



Key:
1. Rate of increase
2. Number of days after heading
3. Sihua No 2
4. Shanyou No 3
5. IR_{661}

9432
CSO: 4007

BRIEFS

SWEET POTATO BLAST--There have been no reports as yet of sweet potato blast in foreign countries. It first broke out in China in 1946 in the provinces of Guangdong and Guangxi, and in 1958 it was transmitted into Hunan and Jiangxi. In 1963, it was carried to Pingyang County in Zhejiang Province. It was first discovered in Fujian Province in Puding County in 1971, and a 1977 survey showed that sweet potato blast was found in 109 communes in 30 counties of Fujian. It has an extremely adverse effect on sweet potato output, and it is the disease that most threatens sweet potato output in our province at the present time. Chinese provinces that have undertaken research on sweet potato blast include Guangxi, Guangdong, Jiangxi, Hunan, Zhejiang, and Fujian, and a great deal of work has been done in addition in Guangdong, Guangxi, and Zhejiang. The problems researched have been concentrated mostly on the identification of the pathogenic bacteria and the range of hosts for the parasites, the avenues for infestation and spread, conditions favoring outbreaks of the disease, varieties resistant to disease, and chemicals useful in prevention and control. Pathogenic bacteria causing sweet potato blast include Xanthomonas batatae n. Sp., Bacillus Kwangsinensis n. Sp., and Pseudomonas batatae n. Sp. [Excerpts] [Fuzhou FUJIAN NONGYE KEJI [FUJIAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 1, 10 Feb 80 p 59] 9432

WHEAT VARIETY RESISTANT TO SCAB--In the formation of a new scab resistant wheat variety, "Minkang 130," we used Sumai No 3 as our material, irradiated it with cobalt 60 (a 2500 dosage), and bred it for six consecutive generations. Its total growth period is about 155 days (earlier by from 3 to 5 days than the original variety). Plants grow to a height of from 105 to 110 centimeters (about 15 centimeters shorter than the original variety); their per thousand grain weight is from 35 to 37 grams; they are resistant to wheat scab, tolerate wetness, turn color well, and are moderate to strong in tillering. In demonstrations conducted in large fields over a 2-year period by the Nanmen Production Brigade of Chengguan Commune in Jianou County under water and fertilizer conditions that were the same as in other large fields, and in years when scab infestations were moderate to heavy in severity, per unit yields were about 300 jin without spraying. In 1978, despite damage from the cold which reduced output, per mu yields were still 279 jin. In 1979, per mu yields were 306 jin. "Minkang 130" is currently the foremost variety with fairly high yields that is scab resistant. Until high yield varieties that are scab resistant are found, it will find use as a transitional variety in inland regions where scab infestations are severe. Its principal drawback is no tolerance for dryness during the sprouting period. As of the present time, units have introduced its cultivation to 18 counties in 7 provinces, and during 1980 there will certainly be experiments with it in large fields. [Text] [Fuzhou FUJIAN NONGYE KEJI [FUJIAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 1, 10 Feb 80 p 43] 9432

CSO: 4007

BRIEFS

SUNFLOWER HARVEST--Zhangye County, Gansu Province, reaped a bumper harvest of sunflower seeds in 1980, exceeding the annual production plan by 4 million jin and doubling the total output in 1979. [SK310840 Lanzhou Gansu Provincial Service in Mandarin 1125 GMT 28 Oct 80 SK]

WUWEI COUNTY IRRIGATION--In the past 20 odd years, Wuwei County, in Gansu, built three medium-sized reservoirs, more than 800 kilometers of irrigation canals and 11 hydroelectric power stations with a total installed capacity of 4,770 kilowatts. Now, of the county's 1.52 million mu of land under cultivation, 1.32 million mu are effectively irrigated, and 970,000 mu are guaranteed of irrigation water. In 1979, despite low temperatures and drought, the county's average per-mu grain output still reached 487 jin. This year the county has reaped a good summer grain harvest. [Beijing XINHUA Domestic Service in Chinese 0322 GMT 20 Oct 80 OW]

CSO: 4007

TRENDS IN REFORMING CROPPING SYSTEM DISCUSSED

Guangzhou GUANGDONG NONGYE KEXUE [GUANGDONG AGRICULTURAL SCIENCES] in Chinese No 3, 8 May 80 pp 8-10

[Article by Liang Guangshang [2733 0342 0794] of the Huanan Agricultural Academy: "The Direction of Development of Reforming the Planting System in Guangdong"]

[Text] For the past 30 years, the reform of the planting system in Guangdong has undergone several stages. During the 1950's, single cropping was changed to double cropping. Growing straw (interplanting) was changed to tilling and upturning the soil (continuous cropping). Mixed cropping (mixed with wild rice) was changed to separate planting. Direct sowing was changed to transplanting. Dry land was changed to watered fields, large plants planted loosely were changed to small plants planted densely. In the 1960's, the planting method was reformed. The square method of planting was changed to the rectangular method, the double season rice field let to dry under the sun after plowing in winter was changed to planting of green manure in winter in double season rice fields. During the 1970's, rotational transplanting and multiple planting were developed. Double cropping was changed to triple cropping. Triple cropping was changed to cropping four times a year. After these reforms, great achievements have been realized. Today, the 1980's have come. According to statistics of 1978, the entire province's total yield of food grains was 32.5 billion jin, averaging an annual per mu yield of 942 jin. Of the area sown with paddy rice, double season rice constitutes 97.9 percent (of which early rice constituted 47.3 percent, late rice constituted 50.6 percent), single season rice constituted 1.8 percent, three-season rice constituted 0.3 percent (according to reports made in 1979, only over 1,000 mu remained, an insignificant amount), and the multiple planting index was 229 percent. Therefore, according to the policy of "taking food grains as the key link, overall development, suiting measures to local circumstances, appropriate centralization," and in reference to the actual conditions of production at present, changing the single and double season rice to a triple cropping system as the central task, and developing rotational cropping, interplanting, mixed planting and companion planting are still the direction of development of the present reform of the planting system.

I. The Theoretical Basis for Developing the Triple Cropping System

In reforming the planting system, the ecological system of the farmland of the locality must be analyzed. Natural resources, social resources and scientific techniques must be fully utilized. Advantageous conditions must be utilized,

disadvantageous factors must be avoided and overcome. A rational agricultural structure must be established to suit measures to local circumstances, to engage in multiple operations in agriculture, forestry, animal husbandry, fishery and sideline production, and to develop on an overall basis. Of the dry substances produced by ordinary crops, 90 percent come from the organic substances produced by photosynthesis, the remaining 10 percent are the inorganic substances absorbed by the roots of the plants. To fully utilize light energy and fertility of the land, one method of course is to develop crop colonies in unit areas via techniques of cultivation and dense planting and to expand "green factories." But to plant only two seasons or one season of paddy rice a year in the watered fields in the tropical and South Asian tropical Guangdong is obviously a waste of natural resources. According to studies, there are four months in which the average daily temperature is above 10°C. At the same time, at localities where the total average daily temperature during the entire period is above 15.7°C, early maturing varieties of single season rice can be cultivated. There are 7 to 8 months in which the daily average temperature is above 10°C. At the same time, at the localities where the total average daily temperature during the entire period is above 20°C, double season rice can be cultivated. The safe growth period of paddy rice is the total number of days of safe growth of paddy rice beginning from the day in early spring when the average daily temperature stabilizes at 12°C to the day in late autumn when the average temperature stabilizes at 22°C added to the number of days the late rice heads to 35 days after maturation. According to this standard, our province's northernmost Nanxiong (25 degrees and 8 minutes N latitude at 133.8 meters above sea level) has 239 days of safe growth period for paddy rice. Yaxian in the southern part of Hainan Island (at 18 degrees and 14 minutes N latitude, 6.8 meters above sea level) has 365 days of safe growth period for paddy rice. If the total growth period of intermediate maturing varieties of paddy rice is taken as 120 days, then double season rice can be planted everywhere in the province. Winter crops need a lower temperature and naturally winter crops can be developed for triple cropping. As for the number of hours of sunshine and the radiative energy from the sun, the total number of hours of sunshine throughout the entire year at Shaoguan in the north is 1921 hours. The radiative energy of the sun throughout the year for each square centimeter is 113,315 Calories. In one year, the total number of hours of sunshine between March and June is 496.1 hours and the amount of radiative energy is 35.814 Calories/centimeter^2. Between July and October, they are 905.9 hours and 50.353 Calories/cm^2 respectively. Between November and March they are 519.9 hours and 26.233 Calories/cm^2. For the triple cropping system of rice-rice-wheat in Guangzhou, early rice receives 463.0 hours of sunshine and 30,690 Calories/cm^2 of radiative energy respectively, late rice receives 707.0 hours and 49,089 Calories/cm^2 respectively, winter wheat receives 754.0 hours and 33,558 Calories/cm^2 respectively. The number of hours of sunshine in Shaoguan is less than in Guangzhou but the amount of radiative energy during the early and late season crops is more but the amount of radiative energy during winter is less. But the amount of sunshine and heat for triple cropping a year is entirely sufficient for the need. Except for the lower temperatures and less heat in the northern mountain regions of the Shaoguan region, crop production at all places of the province can yield three crops a year. Under the situation of the past 10 years, the entire province's food grain production has lingered between 32 billion and 34 billion jin, it may be easier to increase multiple planting to increase yield than to raise unit yield or expand the planting area in an attempt to increase yield. It is necessary to take triple cropping a year in watered fields and

double cropping a year in dryland as goals, and to establish a rational crop production structure by adjusting the planting areas of rice-wheat, rice-potato, rice-beans, rice-sugar cane, rice-jute, rice-green manure, and rice-vegetables (planting vegetables in rice fields in winter) in the area of rice fields.

II. Changing Single Season Rice to Double Or Triple Cropping

The entire province has about over 600,000 mu of single season rice, mostly formed individually by environmental conditions of cold or dry or waterlogged conditions. Cold regions: such as the northern mountain regions of severe cold in the Shaoguan region, there is a definite area of single crop fields. These should be changed to double cropping of rice-rape, or rice-broad bean (pea, green manure) etc. according to actual conditions. Regions affected by drought: At various places there are still relatively large areas of rice fields where only one season of paddy rice is planted each year because of spring drought or autumn drought. If water conservancy projects can be built, these fields can be changed to triple cropping of paddy rice and dryland food grains a year. Even if water conservancy cannot be immediately solved, they should be changed to planting dryland food grains as double cropping fields. For example, Yangshan County has always planted corn in dry fields and drylands, potato or sorghum and corn in autumn. The yield of the two seasons of dry food grains is not lower than the yield of two seasons of paddy rice. Regions affected by waterlogging: There are about 100,000 mu of "pond fields" such as in Qingyuan County along the banks of the lower reaches of Beijiang. Because of outward flooding and inward waterlogging during summer and autumn, only one season of paddy rice is planted each year. If levies and flood gates such as those built in the sandy fields in the Pearl River Delta can be constructed to prevent floods and break the tides, and if electrically operated drainage can be set up, then inward waterlogging can be avoided, and double season paddy rice can be planted. Even if flooding and waterlogging cannot be overcome immediately, the period when the fields are under water should be utilized for raising fish. Rice can be planted after the water has receded. When the rice has matured, wheat following rice or astragalus following rice can be sown to become triple cropping fields.

III. Changing Double Season Rice to Triple Cropping

The province is currently using the triple cropping system of double season rice mainly of rice-rice-wheat, rice-rice-potatoes, rice-rice-beans, rice-rice-green manure (green manure).

(1) The Triple Cropping System of Rice-Rice-Wheat

This is the major planting system of our province. In 1978, the spring harvest was over 6 million mu of wheat, averaging a per mu yield of 141 jin. The area and yield all have potential. It is often said that "planting wheat causes the land to become infertile" and wheat "easily germinates" and thus nobody is willing to plant wheat. But one must not "refuse to eat because he is afraid of choking." The techniques and measures of cultivation should be actively improved and dryers for wheat seeds should be used.

(2) The Triple Cropping System of Rice-Rice-Potato

The region between the southern part of the Zhanjiang area to Hainan Island has always been winter potato producing region. If cold resistant varieties can be selectively used for early planting and fast growth so that potatoes can fruit before the frost begins, and with the implementation of temporary frost prevention measures (irrigation and smoking etc.) then high yields can be realized. But in winter planting of potatoes in areas along the central and eastern coast north of Maoming and Gaozhou, there is always the threat of reduced yield or reduced harvest due to damage by frost in ordinary years. At these localities, the planting system should be changed to a triple cropping system of early rice-autumn potato-winter wheat, or a triple cropping system of rice-rice (early rice varieties)-late autumn potato. These can yield 20 percent to 30 percent more than the planting system of rice-rice-winter potato. Also in regions (such as Hainan Island) where late rice can be damaged by typhoons, late rice can be changed to autumn potato to avoid such damage.

(3) The Triple Cropping System of Rice-Rice-Beans (Peanuts, Soybeans, Broad Beans, Peas, Green Manure)

All of these systems are customarily used in our province. The first triple cropping system of early rice-late rice-winter peanuts can be continuously propagated on Hainan Island. Many places in the province customarily use the triple cropping system of early peanuts-late paddy rice-winter potatoes (wheat). In recent years, the planting system was changed to early rice-autumn peanuts-winter potatoes (wheat) in the Zhanjiang area because there were conflicts between the time of harvesting early peanuts and the harvesting of early rice, in the labor force and in the work of drying the harvested crop under the sun. This is a reasonable reform. The second triple cropping system of early rice-late rice-winter soybeans has always been propagated in Dongwan and Gaozhou counties. In the triple cropping system of early soybeans-late paddy rice-winter wheat, in the farmland of various places and in the sandy fields in the Pearl River Delta, the fields after harvesting of early soybeans are utilized as seed beds for late rice and thus it is not necessary to pre-arrange empty watered fields during the earlier season for seed beds for late rice. This is suiting measures to local circumstances and is worth practicing. The third triple cropping system of early rice-late rice-winter broad beans (peas, astragalus, vetch) is a very common planting system. In the Meixian region the last crop is broad beans, in Huiyang and Chaozhou areas it is peas, in regions throughout the province the third crop is astragalus or vetch. These systems should be continuously popularized. Generally speaking, the triple cropping system of rice-rice-beans and the triple cropping systems in which rice, soybeans and peanuts are interchanged during the early and the late seasons are all planting systems that can nurture the fertility of the land. Setting aside a definite proportion of area in the early season, the late season and in winter is also a direction for development.

(4) The Triple Cropping System of Rice-Rice-Vegetables (Tobacco)

This is a system used at various places throughout the province to plant vegetables in rice fields, such as carrots planted at various places, cabbage of the Foshan area, garlic of Kaiping, winter tobacco of Gaohe and Nanxiong, wax gourd, peas and leaf mustard of Shantou etc. which are all famous regional specialties.

They can enrich the rice fields and they also have economic benefits. These are good methods of diversification, increasing yield and increasing harvests. The four types of triple cropping systems mentioned above evaluated from the point of view of utilization of land and nurturing of land show that the rice-rice-wheat system exhausts the land. The rice-rice-beans and rice-rice-potato systems nurture the land. The rice-rice-green manure (astragalus and vetch) and rice-rice-vegetables (tobacco) systems make the soil fertile. In planning for production and the distribution of crops, a definite proportional area must be arranged to regulate nurturing of the fertility of the soil and increased yields will be the natural results.

IV. Developing Rotational Planting, Interplanting, Mixed Planting and Companion Planting

The methods of rotational planting, interplanting, mixed planting and companion planting in the watered fields and dryland in our province are varied. These are closely related to the agricultural structure, diversification and nurturing of the fertility of the land.

(1) Rotational Planting

The system of rotational planting of watered fields and dryland is an important measure to nurture the fertility of land, prevent and eliminate diseases, insects, weeds, avoid natural disasters and raise the yield of unit area. The 1-, 2-, 3-year rotational planting system of such crops as dryland rice-wheat-potatoes (sweet potato, cassava) and beans and corn in dryland is used throughout the province as well as the 1-, 2-, 3-year rotational planting system of rice-taro, rice-wheat, rice-beans, rice-potato (sweet potato, white potato), rice-sugar cane, rice-jute, rice-tobacco etc. In recent years, the area, total yield and annual per mu yield of the two rotational planting systems of food grain crops and economic crops have all increased remarkably. According to studies of the triple cropping system of early peanut-late paddy rice-winter wheat conducted by the Guangdong Provincial Agricultural Science Academy, the percentage of utilization of light and temperature conditions and the growth seasons of the entire year of this system reached 80 percent to 90 percent while that of the double cropping system of double season rice was only 60 percent to 65 percent. Planting paddy rice in fields previously planted with peanuts can produce an increased yield of 80 to 100 jin per mu. This is because peanuts can fix 8 to 12 jin of nitrogen per mu. The leaves, vines, remnant roots and bran of peanuts (as feed, the bran is converted as barnyard manure) are returned to the soil as fertilizers. They can improve the soil and raise the fertility. In one production unit whose total yield of food grains for the entire year does not drop, the area of medium and poor fields for planting spring peanuts or autumn peanuts can be as much as 30 percent of the area of the rice fields. Planting rice in fields previously planted with rice and sugar cane in rotation can produce an increase of 40 to 50 jin of rice per mu. Since 1972, the Huangbian Production Brigade of the Shatou Commune in Fanyu County has used the planting system of two rice crops and two crops of fish. The average annual per mu yield of early and late rice of six mu of land reached between 1,350 and 1,400 jin, and the total per mu yield of summer fish and winter fish was between 460 and 500 jin. This can be implemented on a trial basis at places where conditions are favorable. Recently, the Huiyang area created the "three rotational planting system." The rice fields of one production unit was divided into three rotational planting zones, the first

zone was for rice-rice-dryland food grain crop; the second zone was for rice-rice-green manure; the third zone was for rice-rice-winter fallow (plowed in winter and let empty to dry). Each zone rotated with the other zone, completing the rotation in 3 years. This changed the ecological system of the farmland and regulated the fertility of the land. This can be tried by all localities.

(2) Interplanting

Interplanting of rice and green manure, like the planting of early rice interplanted with sesbania in Shantou and Foshan regions, and before harvesting of late rice, astragalus is sown following rice. This system is called the two grain crops and two green manure crops system. It nurtures the fertility of the soil and increases yield. Interplanting of rice and jute like the interplanting of early rice and jute in the various areas of Shantou, Foshan and Zhaoqing, and after harvesting the jute, late rice is planted. Jute has a stem that grows straight and tall and there are few or no branches. Interplanting jute and rice is more beneficial to the growth of early rice than interplanting of sesbania and rice. Interplanting of potato and soybeans like the interplanting of soybeans, corn, carrots with winter planted sweet potatoes in Gaoznou County yields four croppings in one crop on one piece of land. The benefits are great. Interplanting of cassava (sugar cane) and soybeans (mung beans), like interplanting of soybeans or mung beans in-between rows of cassava in Dongwan County, allows turning under of green parts of the plants as green manure, and interplanting of sugar cane and mung beans as green manure are all very popular and are beneficial to the formation of organic fertilizers during the middle and late periods of cassava or sugar cane. Interplanting of tropical crops and dryland food grains, like interplanting of dryland rice, corn, peanuts and cassava in-between rows of tropical crops such as lemongrass, sisal hemp, pineapples, on the Leizhou Peninsula and on Hainan Island is very popular and the results are good. Forests and food grains are interplanted such as in Xinyi, Huaiji, Gangning, Lechang counties where mountains have been reclaimed to plant fir, bamboo, oil tea etc. and interplanted in-between rows of the young forest trees are dryland rice, cassava, corn, peanuts. The areas of these are expansive and the benefits are great. For example, the Sihe Commune of Xinyi County has a lot of mountain land. Each year, over 20,000 mu of mountain land are reclaimed to plant fir and interplant cassava. In some production brigades, each person can receive an average of 3,000 jin of cassava a year. The entire commune has over 50 small scale cassava powder refineries powered by hydroelectric power. Each refinery processes 5,000 jin of fresh cassava a day. They also can grind rice, use their power for lighting, and they have led construction of the mountain regions foreward and developed agricultural, forestry, animal husbandry and sideline production.

(3) Mixed Planting

At various places throughout the province, peanuts are planted in drylands and most are mixed planted with corn, millet, sesame and such crops. One is tall and the other is low, forming a combined colony. Light energy and fertility of the land can be fully utilized. Many croppings in one crop on one piece of land increase yield and harvests.

(4) Companion Planting

Throughout the province it is customary to plant wheat following rice, plant astragalus following rice, and in winter potato producing regions, potato is planted following rice. The companion planting of wheat or sweet potato or astragalus seeds scattered and sown is done 12 days before harvesting of late rice. This is done to extend the growing period of the winter crop, and it is a planting method to increase yield. Sowing of late rice seedlings following early rice like the cultivation of late rice seedlings following rice in sandy fields in Zhongshan County during the period 10 to 12 days following rice can eliminate the necessity of pre-arranging empty rice fields (10 percent) during the early season as late rice seed beds. This does not reduce the area of early rice and the yield can be increased. In the sandy fields and farmland on the plains where there is difficulty allocating seed beds for late rice, this method can be popularized.

Generally speaking, the triple-cropping-a-year system mentioned above and the planting systems of rotational planting, interplanting, mixed planting and companion planting each has its own outstanding characteristics at different localities. The five sectors of agriculture, forestry, animal husbandry, fishery and sideline production can use one, or two or three of these methods at the same locality and at the same time for production to suit measures to local circumstances and to utilize these methods in a versatile manner. Overall planning requires a survey of agricultural resource, analysis of the ecological system of farmland and the implementation of agricultural zoning to develop production.

9296
CSO: 4007

NEW LATE VARIETIES, HYBRID COMBINATIONS INTRODUCED

Late Rice Introduced

Guangzhou GUANGDONG NONGYE KEXUE [GUANGDONG AGRICULTURAL SCIENCES] in Chinese No 3, 8 May 80 pp 53-54

[Article by Li Shanfa [2621 0810 4099] of the Guangdong Provincial Agricultural Bureau and Huang Guizhang [7806 2710 4545] of the Paddy Rice Institute of the Guangdong Provincial Agricultural Science Academy: "Introduction to New Varieties of Late Rice and New Hybrid Combinations"]

[Text] New Varieties of Late Rice

(I) "Nan Ke Zao"

"Nan ke zao" is the hybrid of late xian "zu nan No 1" and "ke 6" crossed by the Huilai County Agricultural Science Institute in 1971 and successfully bred in 1975. It is a temperature sensitive variety that is slightly sensitive to light.

It first participated in the provincial regional experiments in 1979 as a late crop. Statistics of 38 test localities showed an average per mu yield of 806.1 jin, an increase in yield of 22.78 percent over the control "guang tang ai." The per mu yield at the Shantou Regional Agricultural Science Institute which is the highest yielding test locality was 1,057 jin, an increase of 41.7 percent over "guang tang ai." In the late season of the same year, it was planted in over 4,600 mu of land in Huilai County. Performance was good, generally yielding 700 to 800 jin per mu, and reaching 1,000 jin.

"Nan ke zao" is early and intermediate maturing. The entire growth period is longer than that of "guang tang ai" by 7 to 10 days. The plant is about 80 centimeters tall. The stalks are clustered. The stems are firm and strong, tillering strength is strong, the color of the leaves is medium dark. During the early period of growth the leaves are bent and drooping. During the late period of growth the boot leaf grows straight, heading is uniform, the percentage of panicle formation is high, there are more effective panicles, and panicles are larger. During the late period of growth there are more green leaves, the branches are green and the straws are waxy, the grains are full, and the thousand grain weight is between 25 and 26 grams. It has a relatively strong resistance to shattering and to blast of rice. It requires a medium level of fertilization, but the leaves are rather thin, and if too much nitrogen is applied during the

middle period of growth, it is easily affected by bacterial blight and its resistance to sheath and culm blight is relatively weak.

Key points of cultivation: It is generally sown after 7 July. Its seedling age is about 25 days. Small plants are densely planted and between 120,000 and 150,000 seedlings are transplanted in one mu. During the middle period of growth, attention should be paid to drainage and refining the seedlings. During the late period of growth, sidedressing should not be applied too heavily, and especially nitrogen fertilizers should not be unilaterally applied.

(II) "Zao Bao Tai"

"Zao bao tai" is an intermediate maturing variety bred from the single plant of the variance selected from the nursery of the original variety "bao xuan No 2" by comrades of the Guangdong Provincial Agricultural Bureau when they visited the Guangxi Shenxi County Superior Seed Farm in 1976. In 1979, it participated in the provincial regional experiments in the late season. The 34 test localities yielded an average of 719.9 jin per mu, an increase of 9.64 percent in yield over "guang tang ai." Generally, per mu yield is 600 to 700 jin.

The variety matures about 10 days later than "guang tang ai." The plant is between 100 and 105 centimeters tall, the stems are pointed and thin, the plant type is not too clustered and not too spread out, the leaves are thin and long and thick and straight, the color of the leaves is emerald green. Tillering strength is strong. The percentage of formation of panicles is high. There are many effective tillers, heading is uniform, the panicles are longer than the original variety, but there are less small panicles. During the late period of growth the color during maturation is good, the fruits are full, the husk is coarse, and the thousand grain weight is between 21 and 22 grams. It is conservative in the use of fertilizers, its resistance to diseases and insects is relatively strong, its adaptability is broad, its demand upon the soil is not strict and it is suited for planting in fields of medium and low fertility. Its shortcoming is that during the late period of growth, the small branches and stems wilt early, it is not tolerant to fertilizers, and it easily lodges.

In cultivation, it should be sown before 21 June and transplanted after 23 July. Its seedling age is 40 to 45 days. The host field requires the additional application of organic fertilizers. During the middle period of growth the field should be appropriately exposed to dry to control ineffective tillers and strengthen resistance to lodging.

(III) "Yu Suo Bao"

"Yu suo bao" is also called "Yu lin bao xuan" or "yu bao xuan." It is an intermediate maturing variety systematically bred from "bao xuan No 2" and introduced into our province in 1977. Generally its per mu yield is between 600 and 700 jin. In the late season of 1979, the Buma Brigade of the Donggang Commune in Xinxing County planted 122 mu. Average per mu yield was 602 jin, an increase of 9.4 percent in yield over the average per mu yield of 550 jin of "bao xuan No 2."

The variety matures 6 to 8 days earlier than the original "bao xuan No 2." The plant is 90 to 100 centimeters tall, 5 to 10 centimeters shorter than the "bao

xuan No 2." The plant type is tightly clustered, the leaves are straight, the tillering strength is medium, heading is uniform, each panicle has about 100 grains and the fruiting percentage is about 90 percent. During the late period of growth the color of maturation is good, the grains are full, the quality of rice is good, and the percentage of yield of rice is high. It is conservative in the use of fertilizers, it has a relatively strong resistance to bacterial blight and is less damaged by insects. Its shortcoming is that its stems are rather tender and weak, it is not resistant to lodging. During the late period of growth the leaves easily yellow and manifest early withering when the weather is overly dry or when drought occurs.

Key points of cultivation: The seedling age is from 40 to 45 days and the seedlings are transplanted at the end of July and the beginning of August. Transplanting specifications are 5 x 4 cun or 6 x 4 cun. About 200,000 seedlings should be transplanted per mu. Base manure should be sufficiently applied, sidedressing should be applied early, fertilizers to strengthen the ending period of growth should be appropriately applied and should be coordinated with the application of phosphorous and potassium fertilizers to strengthen resistance to lodging. During the late period of growth, irrigation should not be terminated too early to prevent early withering which will affect the weight of grains.

(IV) "Tie Qiu No 15"

"Tie qiu No 15" is a new late season early and intermediate maturing variety bred successfully in 1977. It is a hybrid of early rice "xin tie da No 2" and late rice "qiu er ai 2-4" crossed in 1973 by the Chaoan County Agricultural Science Institute. In the late season of 1979, it participated in the provincial regional experiments. The average per mu yield of 39 test localities was 695.5 jin, an increase of 5.92 percent over the control "guang tang ai," ranking 7th place. In 1978, the Chaoan County Agricultural Science Institute planted 32.76 mu, average per mu yield was 973.6 jin. Of these, 1.08 mu produced a per mu yield of 124.4 jin. The Neipan Brigade of the Dongfeng Commune in Chaoan County planted 328 mu with an average per mu yield of 1,103 jin.

The variety is an early and late hybrid variety. Its sensitivity to temperatures is stronger but its sensitivity to light is relatively weak. The entire growth period is longer than that of "guang tang ai" by 6 to 10 days. The plant height is about 85 centimeters, the plant type is pointed and clustered, the leaves are thick and straight, the color of the leaves is dark green, and during the early period of growth the leaves are narrow and short. It reacts sensitively to fertilizers, it is tolerant to fertilizers and resists lodging. Its tillering strength is strong and its growth trend is prosperous. It has more effective panicles, generally from 230,000 to 240,000 panicles per mu. Each panicle has 70 to 80 grains. The fruiting percentage is about 90 percent. The thousand grain weight is 24 to 25 grams. During the late period of growth, the color of maturation is good, it is more resistant to bacterial blight and verticillium wilt but it is easily affected by sheath and culm blight and rice leaf hopper. If fertilization and irrigation are not managed well, red wilt easily occurs. The variety is suited for planting in high yielding and fertile fields.

Key points of cultivation: It is suitable for sowing on 7 July and transplanting about 7 days after 23 July. The seedling age is about 25 days. Between 80 and

100 jin of seeds are sown in one mu and small plants are planted densely. In fertile fields, 100,000 seedlings can be transplanted in one mu. The method of fertilization should be to "apply fertilizers at the beginning, to stabilize application during the middle period of growth and to apply fertilizers as supplements during the ending period of growth." After transplanting, irrigation should be terminated early for intertilling. Additional phosphorous and potassium should be applied to prevent red wilt disease. During the middle period of growth, the fields should be dried under the sun to refine the seedlings. Attention should be paid to preventing the occurrence of sheath and culm blight and the rice leaf hopper.

(V) "Hua Zu Ai"

"Hua zu ai" is a new late xian intermediate and late maturing variety bred as a hybrid of "shuang hua ai" and IR20 x zu yin 2" by the Paddy Rice Research Institute of the Guangdong Provincial Agricultural Science Academy. Its maturation time is basically the same as that of "er bai ai." In the late season of 1979 it participated in the provincial regional experiments for the first time. The average per mu yield of 35 test localities was 759.8 jin, ranking second place, following "er bai ai."

The variety's greatest advantage is its stronger resistance to bacterial blight and higher tolerance to cold during the late period of growth. The plant height is about 90 centimeters. The plant type is not too clustered and not too spread out. The stem is firm and hard, the leaves are straight, narrow and thick, the tillering strength is intermediate, the panicles are larger, the fruiting percentage is above 90 percent. During the late period of growth the branches are green and the straws are waxy. It is suited for planting in coastal regions where there are strong typhoons and where bacterial blight easily occurs.

(VI) "Tang Chao Ling"

"Tang chao ling" is the late season early maturing variety selected from the intermediate line of the variety "caho ling No 11" of the Guangxi Lingshan County Agricultural Science Institute by the agricultural science station of the Tangxia Commune of Xinhui County in 1974. It matures slightly later than "guang tang ai." It participated in the provincial regional experiments in 1978 and 1979 consecutively. Per mu yields were 589 jin and 705.5 jin respectively, an increase of only 1 percent and 7.45 percent over those of the control "guang tang ai." It performed better at the test localities in the Shaoguan and Foshan areas. The agricultural science institute of Qujiang County tested it in the late season in 1979. Per mu yield was 920 jin, ranking first place, and yielding an increase of 13.1 percent over that of the control "guang tang ai." The agricultural science institute of the Foshan area tested it in zones in 1979. The per mu yield was 723.5 jin, an increase of 14.3 percent over that of "guang tang ai."

The variety has a plant height of about 90 centimeters, the stems are intermediately clustered, the growth trend is prosperous and the nodes are exposed, the leaves are relatively wide, the tillering strength is intermediate, heading is uniform, each panicle has about 100 grains, the fruiting percentage is about 85 percent, the thousand grain weight is between 20 and 21 grams, the color of the grain is coarse brown and the husk is thin. It is only lightly affected by

bacterial blight and sheath and culm blight but during the late period of growth the leaves show reddish brown spots and manifest early withering. At the same time the leaves easily grow profusely. It is suitable for planting in fields of medium fertility.

Key points of cultivation: The healthy seedlings cultivated for about 40 days can be reasonably densely planted. When planting in infertile fields, mountain ditch fields and sandy fields, the number of transplanted seedlings should be appropriately increased. Sidedressings to strengthen the ending period of growth should be applied timely. During the late period of growth, irrigation should not be terminated too early. The seeds must be sanitized before sowing to prevent profuse growth.

Hybrid Rice Combinations

Guangzhou GUANGDONG NONGYE KEXUE [GUANGDONG AGRICULTURAL SCIENCES] in Chinese No 3, 8 May 80 pp 54, 37

[Article by Wei Sitian [7614 2448 3240] of the Agricultural Science Institute of Xingning County: "New Combinations of Hybrid Rice--'Zhen Shan 97A' x 'KE 30'"]

[Text] The new heterosis combination produced by the agricultural science institute of the Xingning County--"Zhen shan 97A" x "ke 30" ("shan you ke 30"), is suited for planting as a late crop. After 3 years of regional evaluation and test planting, it showed a prosperous growth trend, a strong tillering strength, uniform heading, abundance of grains and large panicles, a better resistance to bacterial blight, a good color during maturation in the late period of growth, early maturation, conservation of fertilizers and high yield. Its entire growth period is about 125 days, generally yielding 700 to 800 jin per mu, sometimes reaching 1,000 jin.

This hybrid was combined in the winter of 1976 on Hainan Island where seeds of "shan you ke 30" were first obtained. In the late crop in 1977, it participated in the provincial heterosis regional experiment sponsored by this institute. The entire growth period was 124 days, each panicle averaged 165 grains, the fruiting percentage was 87.3 percent, the thousand grain weight was 27.4 grams, the average per mu yield of small zones was 1,086.6 jin.

In the late crop of 1978, it participated in the heterosis demonstration experiment organized by the provincial seed company at this institute. The ordinary varieties "er bai ai," "gui chao No 2" and "guang tang ai" were used as standard varieties. The experiment was conducted over large areas of fields separately fertilized by 10 jin of pure nitrogen per mu (medium fertility area) and by 20 jin of pure nitrogen per mu (high fertility area). The results in the medium fertility area showed that the entire growth period of "shan you ke 30" was 129 days, the yield led all the 15 varieties that participated in the experiment, and per mu yield was 884.2 jin, an increase of 31.9 percent in yield over "er bai ai," 24.3 percent over "gui chao No 2," and 54.6 percent over "guang tang ai." In the high fertility area, the entire growth period of "shan you ke 30" was 131 days, the yield was the second highest (following only "wei you No 6"), and per mu yield was 718 jin, an increase of 22 percent in yield over "er bai ai," 13.2 percent over "gui chao No 2," and 29.1 percent over "guang tang ai."

In the late crop of 1979, the provincial coordination and cooperation group included it in the regional evaluation at 8 localities. Nine varieties participated in the test. "Shan you ke 30" ranked second with an average per mu yield of 774.6 jin, an increase of 10.2 percent in yield over "gui chao No 2," and 9.88 percent over "shan you No 2."

Because the growth periods of "zhen shan 97A" and "ke 30" are not very different, seed propagation was easy and successful. Take 1978 for example, the restorer line "ke 30" was sown in three phases 8 to 10 days apart between 18 February and 9 March. The first and second sowings were transplanted on 6 April. The third sowing was transplanted on 16 April. When the sterile line "zhen shan 97A" was sown on 8 April, the first sown restorer line had 7 leaves, the second sown had 5.8 leaves. The first sown restorer line required 113 days from sowing to the beginning of panicle formation. The second sown required about 109 days and the third sown required about 102 days, while the sterile line required 65 days. The greatest time gap between the male and the female parents has to be controlled to within 48 days so that the flowering periods will meet. Per mu yield during seed propagation is about 100 jin.

9296
CSO: 4007

BRIEFS

STATE FARM ACHIEVEMENTS--Hebei has 31 state-operated agricultural-livestock farms with a total of 1.53 million mu of farmland and more than 90,000 workers. In 1979 they scored the following gains over 1978: total grain-bean output up 10 percent; grain turned over to the state up 20 percent; production of grain, oilseeds, meat, milk, fruits and aquatic products also registered various degree of increase; profits totaled 30 million yuan--up 10 percent. [Beijing ZHONGGUO NONGKEN [CHINESE AGRICULTURAL RECLAMATION] in Chinese No 2, 24 Feb 80 p 25]

CSO: 4007

EXPERIMENTS TO ACHIEVE HIGH, STABLE SOYBEAN YIELDS

Nanjiang Region

Beijing NONGYE KEJI TONGXUN [AGRICULTURAL SCIENCE AND TECHNOLOGY NEWSLETTER] in Chinese No 1, 15 Jan 80 p 18

[Article by Qi Wenshi [7871 2429 1102] of the Laolai Middle School of Nahe County, Heilongjiang Province: "Measures to Produce High Yields of Soybeans in Cold and Cool Regions"]

[Text] Our school is located in the northernmost part of the Nanjiang region. In ordinary years, the frostless period lasts 110 days. We began to study measures of cultivation to produce high yields of soybeans in 1975, and we achieved good results. For 4 continuous years (over 5 mu in area) the per mu yield all surpassed 400 jin. We used the early maturing variety feng shou No 11 which has a strong stalk, resists lodging, is tolerant to fertilizers and dense planting and we also implemented the following measures:

I. Dense Planting in Narrow Rows

Early maturing varieties are small in size, the yield of the single plant is low, and if the colony is not enlarged to assure the number of plants, per mu yield cannot be increased. But, early maturing varieties are short, they have strong stalks, they are resistant to lodging, and their plant type is clustered, and they are suitable for increasing the planting density. These make up for the weakness of low yield of the single plant of early maturing varieties.

For the past 4 years, we used a row distance of 30 centimeters or 35 centimeters for flat seeding. Although the number of soybeans per mu suddenly increased from 27,000 plants to 40,000 plants per mu, the space between the plants and the space between rows were rationally planned and the structure of the colony was more coordinated than planting on ridges. Even though the plants were very densely planted, the plants were not overly shaded. According to our 4 years of surveys, the area of green leaves of plants flat sown in narrow rows visibly increased over that of plants planted on ridges. The leaf area index at the time of forming the pods reached 5.5. Because the leaf area increased, photosynthesis strengthened, and this helped raise the yield.

II. One Stimulation Is Effective to the End

Early maturing varieties like fertilizers and water. Their stems are strong, the plants are shorter, the growth period is short, and all of the growth stages are concentrated. To satisfy the needs of vegetative growth and reproductive growth of early maturing soybeans, to stimulate vegetative growth and the accumulation of dry substances, to assure the colony reaches a definite prosperity, we used spring stimulation, summer stimulation, stimulation in ordinary years, or the method of one stimulation that is effective to the end.

(1) We selected secondary marshlands of fertile soil that had a loose texture and that preserved water and fertilizers to plant early maturing soybeans. Such land has a good fertile foundation, moisture is sufficient, and the need for moisture throughout the entire life of the early maturing soybeans can be satisfied. In addition, the soil must be deeply turned up to thicken the active soil layer and the surface must be prepared, leveled, raked and refined year after year to overcome the weaknesses of early maturing soybeans which have few root nodules and which have a weak ability to fix nitrogen. These measures provide a good foundation for the early maturing soybeans to grow a prosperous root system and more root nodules and fix more nitrogen.

(2) Increasing the application of farmhouse manure and skillfully utilizing chemical fertilizers and applying well trace elements means using fertilizers to assure the yield.

1. Applying base manure and fertilizers for seeds: According to our observations, during the seedling period of soybeans, the root nodules have not yet formed. Even when the plant has grown two true leaves and when the naked eye can see the root nodules, because they cannot fix nitrogen, they are ineffective root nodules. This period, we believe, is the period of nitrogen deficiency in soybeans. In addition, early maturing varieties are more sensitive to the effects of fertilization than medium and late maturing varieties. Therefore we should apply fertilizers to specifically satisfy this characteristic of early maturing soybean varieties. Besides applying 6,000 jin of decomposed dung as base manure per mu, 10 jin of ammonium nitrate per mu were also applied, and 20 jin of calcium superphosphate were applied as fertilizers for seeds to satisfy the needs of growth of the soybean plants during the seedling period.

2. Sidedressings:

After soybean flowers, the plant enters a period of alternate vegetative and reproductive growth. According to our surveys, the time from sowing of early maturing soybeans to flowering lasts 52 days. The dry weight of the single soybean plant is 9 grams, constituting 31.4 percent of the biological yield of the single plant. The time from the emergence of the first flower to maturation lasts 50 days. The dry weight of the single plant of soybean is 19.8 grams, constituting about 68.6 percent of the biological yield of the single plant. It can thus be seen that about two-thirds of the dry weight of the soybean plant is formed after flowering. Therefore, the flowering period, the pod forming period and the period of formation of the bean require massive amounts of immediately effective nitrogen and phosphorus. During this period, relying only on the original fertility in the soil and the fertilizers applied frequently cannot satisfy the needs of growth and

development of soybeans. During this period, we applied phosphorous sidedressing and also applied 5 to 10 jin of ammonium nitrate as sidedressing. These measures served importantly to satisfy the need of growth of feng shou No 11 soybean plants and to assure sufficient fertilization for the plants to achieve a certain height and to preserve their flowers and pods.

3. Ammonium molybdic acid mixed with the seeds: Ammonium molybdic acid is a kind of trace element fertilizer. It can increase the capability of the root nodules to fix nitrogen and stimulate soybean's absorption and conversion of nutrients. We mixed 25 grams of ammonium molybdic acid and 150 jin of seeds and achieved better results equivalent to an increase of 8 percent in yield.

(3) Spraying sodium hydrosulphite during the peak flowering period:

Sodium hydrosulphite is a suppressant of photosynthetic respiration. Spraying sodium hydrosulphite on soybeans is a chemical method to raise the photosynthetic efficiency of soybeans. This is a good method to achieve high yields of soybeans. According to the 4 years of experiments conducted at our school, spraying 60 to 100 ppm of sodium hydrosulphite during the peak flowering period can produce an increased yield of from 11 to 22 percent.

III. Timely Late Sowing

Timely late sowing can avoid dryness in spring and benefits the preservation of seedlings. Inducing weeds to grow early benefits weeding before sowing. Timely late sowing can also make the soybeans flower and fruit after the rainy season starts and this benefits the preservation of flowers and increases the formation of pods. The growth period of feng shou No 11 is 100 days, and in our area it can be sown 10 days late. When sown on 1 June, soybeans can mature normally and completely before frost occurs.

Harkin Area

Beijing NONGYE KEJI TONGXUN [AGRICULTURAL SCIENCE AND TECHNOLOGY NEWSLETTER] in Chinese No 1, 15 Jan 80 p 19

[Article by the Soybean Research Institute of the Heilongjiang Academy of Agricultural Sciences: "How to Produce High and Stable Yields of Soybeans?"]

[Text] From 1970 to 1977 we conducted research and experiments in the techniques of cultivating high yield soybeans and their patterns in the Harbin area. Per mu yield basically was above 400 jin. The highest yield of 416 jin was reached in 1977. The major measures and techniques of cultivation used to produce a per mu yield of 400 jin of soybeans are comprehensively described below:

I. Establish the Four Foundations Well

(1) Good soil structure:

A high soil fertility and a good soil structure are the foundations for realizing high and stable yields of soybeans. Fields that produce high yields year after year are improved by effective measures over many years. For example, greatly

increasing the application of grassy charcoal, using green manure to improve the soil and returning stalks and stems to the fields all increased the efficiency of fertilizers in the soil and improved the soil's physical properties greatly. In general, the indicators of soil that can produce high yields of soybeans are: (1) A rich content of organic substances. High yielding fields all have a content of organic substance of over 4 percent. (2) A deep and thick active soil layer. Soybean is a deep root crop. The deeper the active layer of soil the more beneficial it is to the development of the root system. Practice shows the active soil layer of generally high yielding fields is always about 25 to 30 centimeters. (3) A good soil structure. The texture of the soil is loose, and "irrigation, fertilization, aeration and warmth" of the soil are good. (4) An appropriate compactness. The soil's unit weight is between 0.7 grams/cubic centimeters and 0.8 grams/cubic centimeters. (5) Sufficient moisture in the soil. Especially after soybeans flower, the content of moisture in the soil generally should remain at 25 to 28 percent.

(II) Increase the application of manure:

Soybean is a type of crop that needs relatively more fertilizers. The characteristic need for fertilizers is different from other crops. Therefore, skillful application of manure as fertilizers seems to be especially important. In order that the vegetative growth and reproductive growth of soybeans can develop evenly, in order to assure that a healthy vegetative body is formed during the early period of growth, in order that the soybean plants do not grow too prosperously causing overly prosperous growth and lodging and shattering of massive amounts of flowers and pods and reducing the yield, it is especially important to greatly increase the application of manure fertilizers having a high content of organic substances before turning over the soil in autumn. This is very beneficial to nurturing the fertility of the soil and increasing the yield of soybeans in that year. Because organic fertilizers are mostly complete fertilizers, the effect of fertilization is stable and long lasting, and at the same time, organic substances can release carbon dioxide during the process of decomposition and decay. This intensifies photosynthesis. After organic fertilizers have been applied in the soil, they can improve the soil's physical properties and increase granular structure so that the soil's permeability is good. According to the results of experiments in cultivation of high yields and the experience of many high yielding units, when the per mu yield of soybeans stabilizes at 400 jin, each mu requires an additional application of superior quality farmhouse manure of 5,000 to 7,000 jin as base manure, at the same time, appropriate amounts of sidedressings of chemical fertilizers are needed after the seedlings have been set according to the fertility or infertility of the soil and the trend of growth of the young seedlings. Generally, each mu requires a sidedressing of 20 to 30 jin of calcium superphosphate, 20 jin of ammonium nitrate and 10 jin of potassium sulphate.

(III) Grasp full seedlings and even seedlings tightly:

There are many factors that affect the full seedlings and even seedlings of soybeans. But the major factor is careless preparation of the fields and careless sowing of the seeds. Therefore, the following two measures and techniques must first be grasped well.

1. Carefully till the soil deeply and prepare the fields. It has been realized in production practices that the major advantages of deep tilling and fine planting are that they create a deep and thick active soil layer, improve the physical condition of the soil, increase the capability to retain water and fertilizers, raise the soil's fertility, and eliminate the spread of weeds. According to the survey conducted by the 853 Farm of the Administration Bureau of the Hong Xing Long Farm, the weight of 100 beans of soybeans can be raised by about 2 grams when the soybean plants are planted in fields deeply tilled to 30 centimeters than fields shallowly tilled to 20 centimeters, and 53 jin more soybeans can be harvested per mu, amounting to an increase of 12 percent. But deep tilling must be combined with fine raking. Only by assuring the quality of deep tilling and fine raking can the permeability of the soil become good so that the soil's surface is fine and even and the amount of granules is reduced, thus creating good conditions for smooth sowing of soybeans and smooth emergence of the young seedlings from the soil.

2. Using advanced sowing methods and raising the techniques of sowing. The emergence of many high yielding types are closely related to advanced sowing methods. Only by using advanced sowing methods can the problems of thinness, density, unevenness, nonuniform depth and shallowness, lack of seedlings and broken seedlings be completely solved. The major advanced sowing methods used for many high yielding types are: (1) Dibbling or bunch planting with precise amounts of seeds on ridges. (2) Mechanized double drilling on ridges. (3) Mechanized flat seeding and then forming ridges or flat seeding in narrow rows and dense planting. Regardless of which method and what tools are used, sowing is a means, the goals are to achieve full seedlings and even seedlings. Therefore, grasping hold of moisture conditions, even seeding and uniform covering by the soil must all be done to preserve and to keep even seedlings according to predetermined density.

(IV) Using varieties that have strong stems and that do not lodge.

II. Grasp the Four Links Tightly

(I) Stimulate healthy seedlings:

Temperatures in early spring in our province are low, the soil is cold, the climate is dry and there is a lot of wind. The natural conditions are very unfavorable to the growth of the young soybean seedlings. Because of the rusting disease of young seedlings, the yield is greatly affected. According to surveys, with the presently available superior varieties, all varieties that grow healthily and rapidly during their seedling period show a trend of increased yield. Major measures to stimulate healthy seedlings are: thinning of the seedlings, grasping weeding and banking soil tightly, loosening the soil, applying sidedressings of chemical fertilizers according to the conditions of the seedlings, eliminating weeds, raising the temperature of the soil to help the growth of healthy seedlings, in particular, forming ridges and trenches and loosening the soil deeply during the seedling period produce even better results.

(II) Grasp stable growth:

After soybean flowers, the temperature continues to rise and the rainy season gradually approaches, growth and development are the most prosperous, and the plants

enter the period of alternate vegetative and reproductive growth. But at this time, if the growth of the vegetative body is overly prosperous, the plants will close and growth will be overly prosperous. This will even cause lodging, reduce the number of flowers and create massive shattering of the flower pods, affecting increases in yield. Therefore, as soon as the leaves are observed to be fresh green in color and are dense and prosperous, and the internodes are visibly extending, immediate measures must be taken to control the situation to suppress overly prosperous growth, such as spraying 2,3,5, tri-iodobenzoic acid which can raise the yield of soybeans by 5 to 15 percent.

(III) Prevent damage by insects:

The major insects that affect the yield and quality of our province's soybeans are bean aphids and core borers. Bean aphids occur every year continuously at all localities. When the weather is dry and arid, damage is even worse. According to surveys, after damage by bean aphids, the yield is affected and the damage causes viral diseases to spread, further creating serious reduction in the yield of soybeans. When damage by bean aphids is discovered, dimethoate or dichlorvos chemicals should be used to spray the plants for prevention and control and to eliminate the damage. In recent years, the core borer has developed and is widespread in the southern regions. If it is not prevented and controlled, it will seriously affect yield and quality. According to forecasts and determinations by sight, during the middle 10 days of August when the soybeans are filling and when groups of adult core borers are discovered flying about, emulsion of dichlorvos can be placed on poles for prevention and control.

(IV) Stimulate early maturation:

At present, the major measures to stimulate early maturation are: Besides using relatively early maturing and stable yielding varieties, the main measure is to loosen the soil deeply during the seedling period and to use loosening of the soil and raising the ground temperature to stimulate healthy growth of the young seedlings. During the middle period of growth, when overly prosperous growth is discovered, chemical agent 2,3,5 tri-iodobenzoic acid which stimulates healthy growth of the stems should be sprayed in time to prevent lodging and to stimulate early maturation. Concentration of the chemical should generally be 100 to 150 ppm. In some cases, sodium hyddrosulphite which is a suppressant of photosynthetic respiration is sprayed during the beginning flowering period. Generally the concentration is 100 ppm. It is sprayed once a week starting from the beginning flowering period and is sprayed a total of three times. This can stimulate the plants to mature 3 to 5 days earlier. During the latter growth period, the fields are weeded. This will also stimulate early maturation.

III. Irrigation

Moisture is indispensible to soybeans. Only with sufficient moisture can the nutrients be dissolved in water for the soybean to absorb and utilize. According to research and experimental results of cultivation of high yielding soybeans, after soybeans flower, and when the soil's moisture remains at 25 to 28 percent, the per mu yield can stabilize at above 400 jin. Especially under dry and arid conditions, irrigation during the yellowing period of leaves can cause the weight

of 100 beans to increase greatly. In 1976, Hei nong No 26 variety was used for testing. The weight of 100 beans produced by the plants that were irrigated was almost 5 grams more than those produced by plants not irrigated. At the same time, according to surveys, when the moisture in the tilling layer of the soil drops to below 18 percent, soybean plants grow slowly, the leaves gradually become dark green, withering occurs at noon, and cracks occur on the surface layer of the soil. These are manifestations of dryness and aridity and deficiency of water of soybean plants. This time should be grasped for timely irrigation. This will visibly increase the yield of soybeans.

9296
CSO: 4007

BRIEFS

HEILONGJIANG SNOWSTORM--Hejiang Prefecture, Heilongjiang Province, is combating a great snowstorm rarely seen in the past 40 years. About 3 million mu of crops in the prefecture were covered by snow. The Hejiang Prefectural CCP Committee and administration office have issued an emergency circular urging the people to harvest as much grain as possible. [Harbin Heilongjiang Provincial Service in Mandarin 1100 GMT 29 Oct 80 SK]

STATE FARM CADRE TRAINING--In 1979 alone, 676 state farm management and technical training classes were set up in the Reclamation Area of Heilongjiang with a total enrollment exceeding 55,760. As a result, 40 percent of cadres at the state-farm level and 33 percent of cadres at the production company level were trained through a rotational system. Despite severe drought and other natural calamities, the total grain/bean output in the Reclamation Area last year might reach 5.53 billion jin, a record harvest and a 13.5 percent increase over 1978. The estimated amount of commercial grain turned over to the state was 2.7 billion jin. Last year's operation yielded a small profit following many years of financial losses. The loss in 1978 alone was 110 million yuan. [Beijing ZHONGGUO NONGKEN [CHINESE AGRICULTURAL RECLAMATION] in Chinese No 3, 24 Mar 80 p 2]

CSO: 4007

BRIEFS

RESPONSIBILITY SYSTEMS--Thanks to the strenuous efforts of the party committee of Sheyang County, Jiangsu, various forms of system of fixed responsibility in production have been established by some 70 percent of the county's 3,800 production teams since last year. A meeting was called recently to discuss further promotion of this system throughout the county. As of 15 October some 280,000 mu of paddy field were completely harvested and 270,000 mu of wheat and barley sowed. [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 26 Oct 80 OW]

JIANHU COUNTY COTTON HARVEST--Commune members in Jianhu County, Jiangsu, have actively harvested and sold cotton. From 28 September to 15 October, they have harvested more than 10,000 dan of unginned cotton and sold 3,700 dan of ginned cotton to the state. [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 24 Oct 80 OW]

TONGSHAN AUTUMN SOWING--Some 270,000 persons in Tongshan County of Jiangsu have been mobilized to dig ditches to protect 650,000 mu of farmland from continuous rainfall which was reported since 4 October. By 12 October some 670,000 mu of autumn crops were planted, or 52 percent of the county's sowing plan. [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 18 Oct 80 OW]

XUZHOU PREFECTURE WHEAT SOWING--Some 700,000 persons in Xuzhou Prefecture of Jiangsu have been mobilized to do a rush job of planting 4.1 million mu of (wheat). Because of an unbroken spell of wet weather since early October, waterlogging was reported in some 1.8 million mu of farmland in Xuzhou Prefecture. [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 19 Oct 80 OW]

RAIN HELPS SOWING--It rained in Xuzhou Prefecture of Jiangsu between the evening of 4 October and morning of 6 October. The average rainfall in eight counties and one municipality was 20.4 mm. This relieved the drought conditions in this area and is very helpful to the autumn sowing of wheat, barley and naked barley now under way. [Nanjing XINHUA RIBAO in Chinese 7 Oct 80 p 1]

HIGHER CROP OUTPUT POTENTIAL--Eighteen experimental plots of about 100 mu each were set up throughout Jiangsu last autumn to try out scientific cultivation method for achieving higher wheat yield. Statistics given at a conference held in mid-August this year showed that the average per-mu yield was 911 jin from a total of 1,786.68 mu, of which 397.91 mu yielded more than 1,000 jin per mu. In addition to these experimental plots, 38 counties have reported that their total areas of wheat, barley and naked barley fields producing 1,000 jin per mu have been expanded this year to twice that of the previous year. This indicates the great potential of increasing the output of these three crops in Jiangsu. [Nanjing XINHUA RIBAO in Chinese 14 Sep 80 p 3]

FISH RAISING EXPANDED--Since the relaxation of policies on the use of water surface, the number of production teams engaged in fish raising activities has been raised in the past 2 years from 100,000 to 170,000, or 54 percent of the total number of production teams in the province. The total production of fresh-water fish for the first half of this year registered a 23-percent increase over the same period last year. Moreover, the fish raising area has been recently expanded by more than 200,000 mu, and the total area used by communes, production brigades and teams for raising fish accounted for 86 percent of the fish raising areas in the province. [Nanjing XINHUA RIBAO in Chinese 28 Aug 80 p 2]

CSO: 4007

BRIEFS

MINOR AUTUMN HARVEST--Jilin Province has completed its minor autumn harvest. As of 20 October, the total output value of minor autumn crops was 65.77 million yuan, of which 32.24 million yuan were native products and 33.52 million yuan were medicinal herbs. [Changchun Jilin Provincial Service in Mandarin 2200 GMT 30 Oct 80 SK]

CSO: 4007

BRIEFS

OIL-BEARING CROPS--The total output of the 4.37 million mu of oil-bearing crops in Liaoning Province is 510 million jin this year, 41.2 percent higher than in 1979. As of 26 October, 140 million jin of oil-bearing seeds had been procured. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 30 Oct 80 SK]

SUPPLY, MARKETING COOPERATIVE--Supply and marketing cooperatives at all levels in Liaoning Province have established 120 joint ventures with communes and other departments. These joint ventures can be divided into four categories: supply and marketing cooperatives invest funds to cooperate with production teams to engage in the processing industry; supply and marketing cooperatives cooperate with communes to establish joint stores to sell the communes' farm and sideline products; supply and marketing cooperatives invest funds to help production units produce badly needed goods and are compensated with goods in 3 to 5 years; and supply and marketing cooperatives invest funds and goods to establish joint stores with communes or enterprises in cities by utilizing the facilities of these communes or enterprises. [Shenyang Liaoning Provincial Service in Mandarin 1100 GMT 29 Oct 80 SK]

CSO: 4007

ERRONEOUS REPORT ON LIVESTOCK DECREASE CORRECTED

Beijing RENMIN RIBAO in Chinese 9 Sep 80 p 1

[Letter to the Editor: "'Drop in Livestock Output in Nei Monggol' Is Untrue"]

[Text] Editor's Note: This letter from the Animal Husbandry Bureau of the Nei Monggol Autonomous Region reveals an example of serious bureaucraticism in our leading organs. As we understand it, this bureau had submitted a report to the concerned central departments prior to July on the increase in livestock in the whole region. How could such a formal report be ignored and someone's "estimation" be used to determine that livestock had decreased in an autonomous region? This newspaper is also to blame for reporting this news item without first verifying it.

To the Editorial Department of RENMIN RIBAO:

The headline report on the first page of RENMIN RIBAO on 4 September, which carried XINHUA's item entitled "Our Country's Animal Husbandry Achieves a Relatively Large Increase in Output This Year," mentioned that "With the exception of the Nei Monggol Autonomous Region, where conditions were serious and livestock output has dropped, conditions in the pastoral areas as a whole are better than last year." This news item, broadcast by the Central People's Broadcasting Radio Station in a joint program on the evening of 3 September, was totally not in accord with the actual conditions of animal husbandry in our region. It is entirely erroneous to call an increase in output a decrease.

On 4 September, not having seen RENMIN RIBAO and not knowing how the article originated, we first checked with the XINHUA branch agencies, radio stations, and newspaper offices throughout the autonomous region, none of which had any knowledge of its origin. We then immediately contacted the Central People's Broadcasting Station, RENMIN RIBAO, and the XINHUA head office. According to the XINHUA head office, "The original text of this article did not include the statement concerning a decrease in livestock output in the Nei Monggol Autonomous Region; this was inserted by the Animal Husbandry General Bureau of the Ministry of Agriculture when it examined the text of the article."

We got in touch with the Animal Husbandry General Bureau to examine and verify how the question of livestock decrease in the Nei Monggol Autonomous Region arose.

Director Zheng of the bureau's office spoke evasively, saying that they "recently heard that the drought in Nei Monggol is serious. A decrease in livestock is an estimate" and "can be regarded as such if the increase in output is slight." We gave a different opinion, reported last June's survey figures to the Animal Husbandry General Bureau, and requested that a correction be carried in the newspaper.

On 5 September, the bureau called to say that, after a joint study with RENMIN RIBAO, it had decided to correct the report. It also said that in order to give consideration to the original text, the correction resulting from concrete study would read: "Although the Nei Monggol Autonomous Region has suffered relatively serious disasters since last year, with the exception of a drop in livestock output in specific areas, the region as a whole had a 19.5-percent increase in livestock, or a net increase of 3.9 percent, which completed the original plan and task."

Please publish the above in your newspaper in order to clarify the truth.

Animal Husbandry Bureau, Nei Monggol Autonomous Region

9586
CSO: 4007

BRIEFS

OIL-BEARING CROPS--Yinchuan, 25 Oct (XINHUA)--A bumper yield was reported from 1.27 million mu of oil-bearing crops in Ningxia Hui autonomous region this year. Total output topped last year by more than 35 percent. Ningxia's sown acreage under oil-bearing crops in 1980 tops last year by 22 percent. In areas where farmland is irrigated by the Huanghe River, total output reached some 30 million catties this year. [Beijing Xinhua Domestic Service in Chinese 0120 GMT 25 Oct 80 OW]

RICE OUTPUT--Yinchuan, 27 Oct (XINHUA)--The newly reclaimed zones in Ningxia Hui autonomous region, which use Huanghe water for irrigation, have conducted scientific farming in 1980, succeeding in raising rice output. There are 700,000 mu of paddy fields in these zones, and the total output may reach 600 million jin. This will be 20 percent higher than the 1979 record. [Beijing Xinhua Domestic Service in Chinese 0137 GMT 27 Oct 80 OW]

SUGAR-BEET PRODUCTION--Yinchuan, 29 Oct (XINHUA)--Ningxia Hui autonomous region reaped a bumper harvest of sugar-beet this year, with the total output amounting to 70 million jin, or doubling the total amount actually procured in 1979. Since 1979, the autonomous region has attached great importance to sugar-beet production, formulated a reward system, readjusted the procurement price and succeeded in raising the commune members' enthusiasm in sugar-beet production. The area planted to sugar-beet throughout the region was expanded to some 39,000 mu this year, or an increase of 56 percent over that of 1979. [OW310635 Beijing Xinhua Domestic Service in Chinese 0750 GMT 29 Oct 80 OW]

PINGLUO COUNTY PRODUCTION READJUSTMENT--Yinchuan, 20 Oct (XINHUA)--Pingluo County in Ningxia Hui Autonomous Region has effected a structural reform in agriculture, forestry and animal husbandry with success. This year the county reduced its wheat acreage from 230,000 to 210,000 mu in favor of planting cash crops. Since spring the county has afforested 7,800 mu, planted 3.6 million trees around houses and villages and along roads and rivers, planted grass to some 7,000 mu and built more than 10,000 mu of basic pastoral farms. [Beijing XINHUA Domestic Service in Chinese 0224 GMT 20 Oct 80 OW]

CSO: 4007

BRIEFS

GRAIN OUTPUT--Qinghai Province has reaped a bumper grain harvest in 1980. The total grain output increased by 10 percent over 1979. Average food grain distributions for commune members in 14 counties in the farming areas increased from 30 to 60 jin over 1979 figures. [Xining Qinghai Provincial Service in Mandarin 2330 GMT 29 Oct 80 SK]

QINGHAI RIVER--The Qinghai Provincial Water Conservation Association recently held a seminar on harnessing the Huangshui River. Seminar participants noted there are 2 million shallows in the Huangshui Valley. Vigorous efforts should be made to transform the shallows, thoroughly harness the river and improve the water and soil conservation to minimize soil erosion, conserve water and improve the ecological balance. Severe droughts in recent years have threatened farm and livestock production in the Huangshui River Valley. Seminar participants advocated completion of projects of neighboring water conservation works so they may retain more water and divert it into the Huangshui River when it becomes dry. They also want to build a dam in the upper reaches of the river to control it. [Xining Qinghai Provincial Service in Mandarin 2330 GMT 27 Oct 80 SK]

PREFECTURAL GRAIN PROCUREMENT--Huangnan Tibetan autonomous prefecture completed the grain procurement task as of 20 October. The total grain output in the entire prefecture increased by 1.1 million jin over that of 1979. Thanks to effective measures, key grain producing communes and brigades in the outskirts of Xining municipality also accelerated its harvesting and threshing operations, fulfilling the grain procurement task ahead of schedule. [SK260613 Xining Qinghai Provincial Service in Mandarin 2330 GMT 25 Oct 80 SK]

LIVESTOCK INCREASE--Qinghai Province has scored fairly good achievements in animal husbandry production this year owing to favorable weather and the success in implementing the production policy. The number of animals raised in the province now surpasses the figure of the corresponding 1979 period by 510,000 head. [SK271225 Xining Qinghai Provincial Service in Mandarin 2330 GMT 26 Oct 80]

CSO: 4007

RATS CAUSING HEAVY CROP DAMAGE IN MANY AREAS

Jinan DAZHONG RIBAO in Chinese 23 Aug 80 p 1

[Report by Zhai Ziheng [5049 1311 1854], Li Zhaoyin [2621 0664 0603], Cui Yuduo [1508 3768 6995], and Zhao Guangrong [6392 1684 2837]: "Masses in Pingying, Tengxian, Ningyang, Dongping and Other Areas, Complaining That Rats in Packs Destroy Crops in Daytime, Ask Leadership and Scientific Research Units To Pay Attention to Measures To Eradicate Rats"

[Text] The masses in Pingying, Tengxian, Ningyang, and Dongping and other areas have written to the editor that damage by rats in farm villages is serious. Food grains, melons, fruits, and vegetables have been badly damaged. Rats come in packs in the daytime and destroy the crops. The masses are very worried. Over 80 percent of a mu of melons near Ligou in Pingying was eaten up by rats in one night. Every piece of land of the 12,000 mu of peanuts in Xiazhuang Commune in Tengxian has been damaged by rats. Some losses amount to 10 percent. Caretaker Jiang Yuliang [5592 3768 5328] of this commune's food grain management office crushed a pear, mixed poison in it, and scattered the poisoned pear in the field. After half a day and one night, 43 rats were killed by the poison. The masses and the party cadres of the Yangshan Brigade of Dongshahe Commune in Tengxian and scientific and technical personnel of concerned provincial departments placed 300 rattraps in the fields where rats had already been killed. Overnight, 110 rats were killed by the traps. Using poisonous bait and using rattraps are very effective methods.

Why do rats become a plague in some places? According to an analysis by the masses of various localities, the main reason is that the four natural enemies of rats have become extinct in many places. According to the masses in Tengxian, in the past there were many foxes in the eastern hilly regions of this country, and there were even more yellow weasels. The cries of owls could be heard echoing between the mountain valleys, and the masses kept cats to catch the rats. Now, the rats do not have these four natural enemies, and thus their offspring are abundant and cause serious damage. The masses are calling upon the leadership and scientific and technical departments at all levels to pay attention to the study of how to effectively eliminate damage by rats.

9296
CSO: 4007

FARM PRODUCTS MARKETS ACTIVE; COMMODITY PRICES LOWER

Jinan DAZHONG RIBAO in Chinese 20 Aug 80 p 1

[Report by Su Guoxi [1372 0948 3886] and Wang Jiuhu [3769 0036 4375]: "Business of Farm Byproducts Markets in Our Province's Cities and Towns is Active"]

[Text] By the end of June, 87 farm byproducts markets were open in the nine provincial- and prefectural-controlled municipalities of Jinan, Qingdao, Zibo, Zaozhuang, Yantai, Weihai, Weifang, Jining, and Dezhou. In county towns and industrial mining districts, 147 such markets were open. During the first half of this year, the business volume of farm byproduct markets in provincial- and prefectual-controlled municipalities was over 46 million yuan--1.2 times higher than the same period last year. The business volume of 10 commodities, including grain, edible oils, pork, beef, lamb, poultry eggs, aquatic products, vegetables, dried fruit, and oil stuffs, exceeded 118 million, which is equivalent to 7.4 percent of the total sale volume of similar commodities in state operatives in municipal areas. As commodities on the market drastically increase, the prices of market transactions decrease. The average market price based on the statistics of 24 chief commodities has decreased by 18.3 percent compared with the end of last year. Variations between list and market prices have appeared for some commodities. The market price of live geese, for instance, is 9.37 percent lower than the list price, while that of apples is 21.43 percent lower.

The opening of farm byproduct markets in cities and towns not only makes life more convenient for staff workers but also provides an important place for production teams and commune members to sell their spare products. Of the total business volume of farm byproduct markets in the first half of this year, 63.8 percent was sold directly by rural commune members, 18 percent by production teams, 16.2 percent by retailers, and 2 percent by other personnel.

9586
CSO: 4007

COMPLAINT OVER CHEMICAL FERTILIZER REWARD BRINGS ACTION

Jinan DAZHONG RIBAO in Chinese 29 Aug 80 p 2

[Letter to the Editor: "Chemical Fertilizer Reward Sale from Grain and Oil Should Be Honored Without Delay"]

[Text] According to policy stipulations, after a commune production brigade completes its task of exclusive purchase of grain and oil, a reward sale of 125 jin of chemical fertilizer is given for every 100 yuan sold in excess. Last year, the Zhaoxian Commune exceeded the exclusive purchase of grain by 6.31 million jin and peanuts by 180,000 jin, bringing a reward of 1.1 million and 160,000 jin of chemical fertilizer, respectively. These two items add up to a reward sale of 1.26 million jin of chemical fertilizer. So far, 730,000 jin of the reward have been fulfilled, but 530,000 jin are still outstanding. The chemical fertilizer reward the year before last has not been honored, either.

In exceeding the sale of grain and oil, production brigade cadres figured closely that so much excess sale would bring a corresponding amount of chemical fertilizer. This fertilizer would be used for production the following year, which would increase the output of grain and oil by so much. They had included the use of this fertilizer in production plans for the following year. No one expected that the reward would become a "bad check." Grain output this summer has decreased. At first, expansion of management measures and compensation in the fall were planned. But now there is no fertilizer to use. The entire commune's 19,000 mu of paddy rice, 23,000 mu of corn, 20,000 mu of peanuts, and 21,000 mu of melons have already shown signs of fertilizer deficiency. Paddy rice in particular has not received sufficient chemical fertilizer, and a drop in output is already a certainty. If the 530,000 jin of outstanding reward sale of chemical fertilizer are received, this will undoubtedly take care of the urgent situation.

Not honoring the reward might even affect grain purchases this summer. Commune cadres said that "the reward sale policy is no longer effective," while production brigade cadres said that "since rewarded chemical fertilizer cannot be bought, we will not sell so much grain this year and will save some to exchange for chemical fertilizer." In the course of our investigation, we learned that one brigade has taken out 5,000 jin of excess wheat which would have been sold to the state, so that it can be used to exchange for chemical fertilizer.

We feel that the situation described above should draw the attention of concerned departments for a speedy resolution.

Zhang Jianling [1728 0494 0407] and Li Zundian [2621 1415 3013], Armed Personnel Department, Juxian County; Guan Xiwen [4619 6007 2429], Zhaoxian Commune

Editor's note: After it received the letter "Chemical Fertilizer Reward Sale from Grain and Oil Should Be Honored Without Delay," the Juxian County CCP Committee immediately called a meeting of those in charge of the units of financial transactions, supply and marketing, production resource corporations, and the grain bureau to earnestly examine the status of fulfilling reward sales of chemical fertilizer in the whole county. An investigative group was organized, and it conducted an in-depth investigation of the 88 production brigades in Zhaoxian Commune and listened to the views and requests of the cadres and commune members. The investigation confirmed that the situation described by Zhang Jianling and the other comrades is basically true. To deal with the existing problems, the County CCP Committee has taken two timely measures: (1) To explain to the cadres at the basic level and to the masses the current reward sale policy, proposing that concerned departments honor the reward sale of chemical fertilizer without delay. (2) To request that all communes strengthen the use and management of the reward sale. Production brigades benefiting from the reward sale must keep and check records, and the sale must be strictly honored by stages and in groups according to plan, without embezzlement or seizure. Their earnest and responsible attitude with regard to the masses' letters deserves praise.

9586
CSO: 4007

USE OF LIGHT, TEMPERATURE IN CROPPING SYSTEM

Shanghai SHANGHAI NONGYE KEJI [SHANGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 1, 5 Feb 80 pp 4-8

[Article by Ding Changling [0002 2490 7881], Grain Farming Laboratory, Crop Institute, Shanghai Agricultural Academy: "A Look at the Cropping System in the Suburbs in Terms of Use of Light and Temperature Resources"]

[Text] Light and temperature are important natural elements in grain production. How to make fullest use of solar energy to increase the efficiency of crop photosynthesis so as to increase the quantity of grains produced, and how to use grain crops in a way in which they are adapted to temperature conditions for the promotion of growth and development while avoiding harm from high and low temperatures are major problems in grain production that urgently await research. Consequently, analysis of the natural laws governing light and temperatures, rational adjustment of crop rotation and crop patterns so as to gain advantages while avoiding disadvantages in order to promote continuously high crop yields possesses major real significance.

1. Characteristics of the Use of Light Energy in Suburban Grainfields

An overwhelming amount of the energy absorbed by plants comes from the radiated energy of the sun. Man's consumption of grain depends chiefly on the photosynthetic action of green leaves, and involvement in research work on the cultivation of grain crops is nothing more than improvement of the rate of use of light energy by crops to increase output of grain. However, inasmuch as changes in radiated energy are fairly great from one year to another, they effect output in varying degrees. For example, during the past 20 years in the Shanghai area, the amount of solar radiation has annually averaged 749.6 million ± 41.25 million kilocalories per mu. The lowest was 675.2 million, and the maximum was 822.4 million kilocalories for a relative disparity of 5.5 percent. Possibly the reason outputs were high in some years and low in others was the result of radiated energy being high or low. Therefore, to use output as the sole indicator of the reasonableness of agricultural methods in years of different balance poses definite problems. Currently, "light energy utilization rate" is widely used both here in China and abroad as an indicator in the study of the use of light energy in open fields. Looked at in terms of the use of radiated energy, this seems somewhat better, but some problems with it still exist, because by light energy utilization rate is meant the efficiency with which crops use light energy to

produce dry material. As to whether these dry materials can be transported to the reproductive organs to form output of grains, is something that is far from being accurately revealed by the light energy utilization rate. Therefore, use of the light energy utilization rate as a sole indicator makes for a poor basis on which to judge whether or not agricultural methods are rational. It may be seen that study of the situation pertaining to the light energy utilization of grain crops requires overall consideration of how green leaves intercept and capture light energy as well as the proportion (the economic coefficient) occupied by these materials in the dry materials produced (the light energy utilization rate) and the output of grains occupies. The product of the light energy utilization rate and the economic coefficient, i.e. the efficiency with which crops utilize radiated energy to produce an output of grains, is termed the "light energy production rate" in this particular article, and its numerical value is as follows: light energy production rate = light energy utilization rate X economic coefficient (1)

light energy utilization rate in the formula = organic output X light energy conversion rate divided by light energy

$$\text{economic coefficient} = \frac{\text{output of grains (i.e. economic output)}}{\text{organic output}}$$

substitution formula (1) is thus:

$$\text{light energy production rate} = \frac{\text{organic output X light energy conversion rate}}{\text{light energy}} \text{ X}$$

$$\frac{\text{output of grains}}{\text{organic output}} = \frac{\text{output of grains X light energy conversion rate}}{\text{light energy}} \qquad (2)$$

The statistical data for output of grains required for the light energy production rate may be provided by the production departments, and calculations are also very easy to do. They may be used to analyze the situation in regard to light energy utilization and are a better means of checking on the reasonableness of agricultural measures.

(1) Changes in the Light Energy Production Rate of Grain Fields in Suburban Grain Fields

Shanghai's suburbs are located at the northern edge of the semitropics where light energy resources are abundant, providing beneficial conditions for the production of grain. During the last 20 years, as superior varieties have found more extensive use, improvements have been made in farming techniques, and increases have occurred in multiple cropping indices, grain output has rapidly developed. In 1978, annual grain output per mu was 1,606 jin, an increase of 122 percent over 1959 and almost 4 times the 437 jin of 1949. As grain output increased, the light energy production rate also increased in a straight line. In 1978, it was 0.499 percent (the light energy conversion rate being figured at 4.2 kilocalories per gram of carbohydrates), meaning that as a result of the activity of rice and wheat crops, about 0.5 percent of the sun's total radiation was used for output of grains, or that the efficiency was about 0.5 percent for

the conversion of radiated energy into output of grains, a 152 percent increase over the 0.198 percent of 1959. (If the economic factor is calculated at 0.5, the light energy utilization rate is virtually in a straight line and expressable in a formula as $y = 0.1851 + 0.01380x$, in which formula y is the light energy production rate and x is the year, with 1959 being year 0 and 1960 being the first year (Figure 1), with the remainder following therefrom. If light energy is calculated in terms of the average value of 750 million kilocalories per mu per year, then for every ton of grain output per year, the light energy production rate must be:

$$\text{light energy production rate (percent)} = \frac{2000 \text{ jin per mu per yr} \times 4.2 \text{ kilocalories/gram}}{750 \text{ million kilocalories per mu per year}} =$$

0.56 percent.

Extend the straight line in the graph, i.e. the speed of growth for the light energy production rate between 1959 and 1978, until the light energy production rate becomes 0.56 percent, and around 1986 an annual output of a ton of grain per year will be attained.

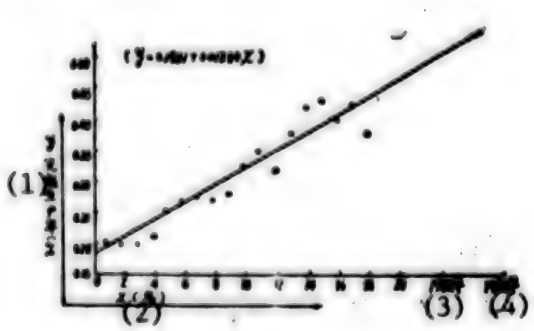


Figure 1. Growth of light energy production rate in suburban grainfields (1959-1978)

Key:

(1) Energy production rate (percent)
(2) X (year)
(3) 1982
(4) 1986

2. Relationship Between Light Energy Production Rate and Multiple Cropping Indices

Along with reforms in the farming system has come a rapid climb in the multiple cropping indices for grainfields in suburban areas. In 1959, the index was 1.59; in 1976, 2.52; and in 1978, 2.47 for an increase of from 55 to 58 percent. During the last 20 years, both the light energy production rate and the multiple cropping indices, as well as annual grain output have all gone up. The light energy production rate and the annual per mu yields of grain have risen almost parallelly, while there have been differences in the multiple cropping indices.

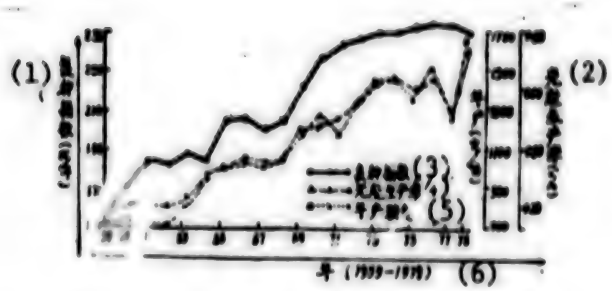


Figure 2. Relationship among light energy production rate, annual grain yields per mu, and multiple cropping indices

Key:

(1) Multiple cropping indices (times per year)
(2) Light energy production rate (percent)
(3) Multiple cropping indices
(4) Light energy production rate
(5) Annual grain yields
(6) Years (1959-1978)

Between 1959 and 1963, the multiple cropping indices rose rapidly, and the light energy production rate and annual per mu yields of grain rose somewhat more slowly than the multiple cropping indices. Between 1959 and 1962, there was little change (Table 1), and only in 1963 was there striking growth (Figure 2).

Table 1. Increases From 1959-1963 in Light Energy Production Rate, Annual Per Mu Grain Yields, and Multiple Cropping Indices

	(1) 59年	(2) 60年	(3) 61年	(4) 62年	(5) 63年
(6) 光能生产率%	0.198	0.208	0.206	0.205	0.219
(7) 粮食年亩产(斤)	724	741	718	713	803
(8) 复种指数(次/年)	1.59	1.72	1.84	1.82	1.88

Key:
(1) 1959
(2) 1960
(3) 1961
(4) 1962
(5) 1963
(6) Light energy production rate (percent)
(7) Annual grain yields per mu (jin)
(8) Multiple cropping indices (times/year)

Between 1964 and 1974, the trend of change was similar for all three. Between 1974 and 1978, multiple cropping indices lay in a state of saturation while both the light energy production rate and annual per mu yields of grain rose and fell suddenly, even appearing to move directly contradictory to the multiple cropping indices. These changes demonstrated the following two points: First, increases in the multiple cropping indices must be interrelated to widespread use of superior varieties and to improvements in farming techniques in order to have striking results in increased output. During 1963 and 1964, late geng variety, Nongken 58, came into general cultivation in the suburbs, making for quite great growth in per

unit yields of single crop late rice. In 1963, yields were 657 jin per mu, a 12.1 percent increase over 1962. In 1964, growth was another 12.5 percent over 1963. From 1964 to 1974, the suburbs developed the three crop system of wheat-rice-rice, with the summer crop gradually becoming wheat for the most part, and with low yield varieties such as "Sanyuehuang" giving way to superior varieties such as "Zaoshu No 3." Low yield geng rice varieties such as awned coarse geng and awnless coarse geng gave way to high yield xian rice varieties such as Zhongganzao, Yuanfengzao, and Guangluai No 4. Late crop rices changed from varieties such as Laolaiqing, and Baimanduanzhong to high yield varieties such as Jianong, Shuangfeng, and Nonghu No 6. While this was going on, farming experience with the three crop system was gradually being accumulated among the masses, thereby causing output to rise with each passing year. Second, multiple cropping indices cannot continue to grow without limit. Once they reach a certain point, various contradictions such as the seasons, the labor force, fertilizer supply, soil fertility, costs and income increasingly intensify. Under these circumstances, if the multiple cropping indices are excessively high, by contrast, the light energy production rate will be made low, leading to a decline in output. In the three crop system of wheat-rice-rice, the seasons are tightly linked. When multiple cropping indices are excessively high, a contradiction occurs in rush transplanting of the late rice crop, and it is prominent in places where there is a large area of land but a shortage of labor. According to statistics, when late season rice, "Jianong 15," is transplanted between 31 July and 12 August, the yields per mu present a striking linear negative relationship to the period of transplanting ($y = 956.35 - 26.97X$ $r = -0.867$, $n = 13$, y being output (jin per mu), and X being the number of days). The later the transplanting, the lower the output. For each day of delay in transplanting, a reduction in yield of about 27 jin occurs. In Songjiang, Jinshan, and Qingfu counties, where there is a lot of land but a scarcity of labor, transplanting of the late rice crops should usually be completed by mid-August. When a minority of production teams delay as long as the 20th of the month, output was very low or the crop might be entirely lost with the light energy production rate amounting to zero. This demonstrates that reasonable restraint on multiple cropping indices, depending on the characteristics of an area, is extremely important in increasing the light energy production rate.

2. Effects of Temperature Changes on Growth of Rice and Wheat

Only under suitable temperature conditions can crops carry on their physiological functions normally. Temperatures that are too low or too high will hamper the progress of growth or damage the reproductive organs so that the light energy production rate will decline, leading to a decline in output. On the basis of the existing farming system, the effects of temperature on the physiological activities of crops are as follows:

(1) Effects of Temperature on the Raising of Early Rice Seedlings

In the suburbs, average daily temperatures are 15.4°C (1873-1972). In the course of a year, the number of days in which temperatures slid for 5 days to less than 11°C totaled 228 $\pm$ 7 (Table 2), and the number of days when temperatures were higher than 15°C averaged 185, which was favorable for the growth of rice.

Table 2. Number of Days When Daily Average Temperatures Slipped for 5 Days to Less Than 11°C in the Shanghai Area (1959-1978)*

Year	Beginning Date Month/Day	Ending Date Month/Day	Number of Days	Standard Deviation
1959	3/20	11/19	245	
60	4/4	11/24	235	
61	3/29	11/20	237	
62	4/6	11/20	229	
63	3/30	11/24	240	
64	3/28	11/9	227	
65	4/13	11/24	226	
66	4/6	11/13	222	
67	4/2	11/11	224	
68	3/29	11/8	225	
69	4/7	11/15	223	
70	4/6	11/21	230	
71	4/5	11/15	225	
72	4/11	11/16	220	
73	3/23	11/9	230	
74	3/20	11/12	227	
75	4/4	11/19	230	
76	4/11	11/10	214	
77	4/2	11/14	227	
78	4/5	11/17	223	
Totals			228.1	± 7.2

*According to data prepared by the meterology office of our institute Using nonrecurring average temperature slippages for 5 days to less than 11°C as a starting point, and by using the beginning of the recurrence of temperature slippage for 5 days to greater than 11°C as an ending point, the beginning and ending points for a specific day were less than 11°C.

But temperature changes are fairly great from one year to another. In the 100 year period 1873 to 1972, there were a total of 11 instances in which late April temperatures reached a low of 6°C, and 54 instances in which they reached a low of 8°C, with the low temperatures posing quite a threat to early xian rice seedlings, which have a weak tolerance for cold. Early xian rice is very temperature sensitive, and if temperatures are excessively high during the period of seedling growth, it becomes prone to "excessive seedling age" in which the panicles are very small and output very low. Days with continuous average temperatures above 20°C after 16 May 1974 numbered only 17 to 20, and this was higher than the average 19.3°C of normal years (1966-1975). During the latter part of the month, they rose to a high of 23.2°C for a combined high of 42.5°C. As a result the early rice of some communes and brigades developed "excessive seedling age"; the light energy production rate declined; and early rice throughout the entire region averaged yields of 706 jin, a decline by 83 jin from 1973.

(2) Threat of High Temperatures for Blossoming and Coming Into the Milk of Early Rice

In the three crop system, the period in which early rice reaches full head and ripening occurs in the Shanghai area during the high temperatures at the height of summer. Experimentation has shown that with high temperatures in excess of 35°C during the heading period, serious damage results to the functioning of stamens, and the pollen does not mature well, with the result that normal pollination is not possible and husks empty of grain result. High temperatures during the period of coming into milk retard transfer to grains in the panicles of the products of photosynthesis to the impairment of full development of the grains. High temperatures during the late stages of development result in forced ripening, which may bring about a decline in the light energy production rate. In addition, because of the high daytime and nighttime temperatures with little variation between the two, not only is a lot of husk produced and the rate of rice production lowered, but the grains of rice are mealy and not very tasty. During the 1970's, high temperatures occurred 3 times in the suburbs (in 1971, 1977 and 1978), causing varying degrees of reduced output. In 1971, early rice yields were 657 jin per mu; and in 1977, yields were 670 jin per mu for declines in output from 1973 of 132 jin and 115 jin respectively. In 1978, yields were 742 jin per mu, for a decline in output of 47 jin. According to meteorological data for the period 1873-1972, there were a total of 42 years in which high temperatures for 3 days in a row during the period 1 to 20 July were greater than 35°C, or about 4 times every 10 years. It can be seen that high temperature damage to early rice is a major problem for production in suburban areas.

(3) The Effects of Temperature on Late Rice

Output of late crop rice is inconsistent with great changes occurring from year to year. The difference in output between years of highest output and years of lowest output has been more than 200 jin. There are numerous reasons for the inconsistency in output. First of all, in mid-September, climatic temperatures decline in suburban areas of Shanghai with lows of 17°C being frequent. When late crop rice encounters damage from temperatures as low as 17°C during the meiosis stage (from 10 to 12 days before full heading), the pollen aborts and the pollination rate declines. Temperatures averaging as low as 20°C may very likely occur after 20 September, and then the late rice crop cannot blossom or set fruit normally. Both these situations easily result in an increase in the number of empty husks, a low grain weight per thousand, and a decline in the light energy production rate. Usually the late rice crop in the suburbs reaches full head before 25 September, and consequently temperature lows during the meiosis period prior to 14 September have quite an effect on output. In the 100 years between 1873 and 1972, such temperature lows occurred 26 times and average daily temperatures as low as 20°C for 3 consecutive days prior to 25 September occurred 24 times during this period. Such temperature lows occurred twice on 8 occasions, which is to say that in the course of 100 years, there were a total of 42 years in which damage from low temperatures occurred, or about 4 times every 10 years. During the 1970's, there were a total of 5 years in which the late rice crop encountered such low temperature damage (1972, 1974, 1976, 1977 and 1979), with output being lowest in 1972 when per mu yields were 525 jin or 200 jin less than for 1973 and 1978. During 1974, 1976 and 1977,

annual yields per mu were 605, 611, and 597 jin respectively, for a loss of more than 100 jin. (On 19 and 20 September 1971, the low temperature was 16°C and the average daily temperature was 19°C. On 19 and 30 September, during the full heading of the late rice crop, an "upward turning of panicles" occurred, and output was extremely low. Average per unit yields from the late rice crop that year were 512 jin, so in the course of the 1970's, low temperatures damaged the late rice crop a total of 6 times.) Second, general light sensitivity is very strong for the late rice crop grown in the suburbs, with you panicles beginning to differentiate around 20 August. Therefore, the period of field vegetative growth for late crop rice that has been transplanted early is quite lengthy, and output is fairly high. Rice that has been transplanted late has a rather short vegetative growth period in the fields, and output is, consequently, fairly low. Inasmuch as climatic changes differ from year to year, with the ripening of wheat, barley, naked barley, and early rice taking place late in some years (such as 1975), the transplanting of late crop rice is correspondingly delayed. Then, even though temperatures may be just right during the period of growth of the late rice crop and a lot of sunlight available, output will still be low, with per mu yields of only 590 jin. In the case of some communes and brigades where the burdens on the soil and on manpower are excessive, there will always be some "foot dragging fields" where, as a result of late transplanting of rice seedlings, the danger of damage from low temperatures is quite serious with frequent occurrences of "turned up panicle heads" and greater losses.

Additionally, in the three crop system in use in the suburbs, spring wheat, Zaoshu No 3, is used as a summer crop, and this variety is prone to cold damage with reduced output if low temperatures occur during late winter or early spring. During the last 10 days of January and the first 10 days of February 1977, low temperatures prevailed for 11 consecutive days with the lowest being -11.2°C, which killed many seedlings and resulted in per mu yields of only 200 jin, and a light energy production rate of 0.132 percent, which was less than half of the 0.283 percent of 1976 and the 0.303 percent of 1978.

3. Rational Readjustment in the Pattern of Crop Rotation and Fullest Use of Light and Temperature Resources

Beginning in January, a gradual increase occurs in the sun's radiation in the Shanghai suburbs. This increase reaches a zenith between July and August and rapidly declines after September to a nadir in December (Figure 3). The link period for two crops of rice in the wheat-rice-rice three crop system is usually during the first 10 days of August just at the time of the maximum amount of radiated energy. According to meteorological bureau data, total radiation during August averages 450.5 calories (1958-1972) per square centimeter per day. For a 15-day period, this totals 40.05 million kilocalories per mu, or the equivalent of the amount of energy stored in 9,536 kilograms of biomass. During this period of time, the early crop of rice is being harvested in the three crop system, and the late rice crop is being transplanted with greening up and the onset of tillering taking place. In places where the labor supply is short, where harvesting and planting may not get done on time, the number of green leaves in the fields will not be numerous and the light energy intercepted and captured will not be great, so much will be wasted. In a two crop system of rice and wheat, the waste

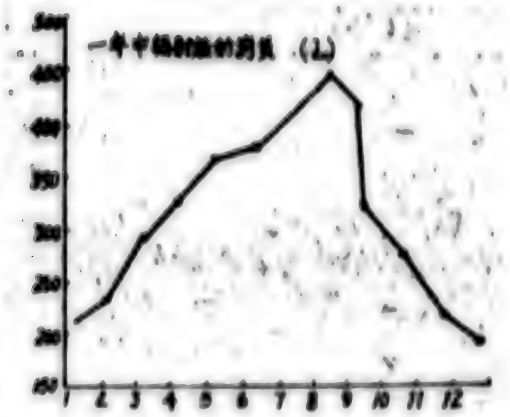


Figure 3. Annual fluctuations in radiation energy (1958-1972 average, based on data from the Shanghai Municipal Meteorology Bureau). Units: Calories/Cm^2per day.

Key: (1) Annual fluctuation in radiation energy

of light energy is also considerable during the period when wheat is being harvested and rice is being planted. In terms of temperature, the Shanghai suburbs offers a lot of latitude for the growing of two crops, but a three crop system is pushing it. In places where the supply of labor and fertilizer is abundant, three crops may be planted, but where they are not abundant, it is best not to. In terms of the popularization of superior varieties, during the past 10 years there has been a continuous replacement of old varieties with new high yield varieties suited to the three crop system. Fairly great increases in the light energy production rate have taken place for wheat, barley, naked barley, early rice, and late rice. Between 1974 and 1978, these rates were 0.229, 0.786 and 0.624 respectively. In comparison with average values for the period 1959-1963, this represented a 80.0 percent increase for wheat, barley, and naked barley, a 49.7 percent increase for early rice, and a 86.4 percent increase for late rice. The light energy production rate for single crops of late rice during the period 1974-1978, however, was only 0.529, an increase of only 32.9 percent over the period 1959 to 1963 (Table 3). It has been precisely the popularization and constant replacement with superior varieties that has created the conditions for the harvest of high output from the three crop system.

In nearby suburban areas where land is scant and people numerous, the labor force can be centralized during the harvest and planting seasons to keep apace of the season and reduce the waste of light energy. By matching varieties with each other and regulating the sowing seasons, it is possible to avoid, for the most part, impairment to most fields caused by high and low temperatures, and irrigation may also be used to lower temperatures or raise temperatures to diminish their damage. Therefore, in terms of the overall area, the three crop system should be the dominant one, but not proportionally excessive. The multiple cropping index should be kept within proper bounds in order to assure harvest of high output.

Table 3. Changes in Light Energy Production Rates for Suburban Grain Crops (percent)

Year	Wheat, Barley, and Naked Barley	Early Rice	Late Rice	Single Crop Late Rice
59-63	0.125	0.525	0.338	0.398
64-68	0.157	0.553	0.464	0.436
69-73	0.181	0.692	0.550	0.487
74-78	0.229	0.786	0.624	0.529

Experience during 1978 in places with ample land and scarce manpower where conflicts were sharp in the uses of seasons and of manpower, showed that suitable reduction in the multiple cropping indices, a retrenchment from some triple cropping, and an expansion of some double cropping, brought outstanding results in increased yields. In 1977, the Zhuanqiao Commune in Songjiang County farmed a total of 22,800 mu of grain with a multiple cropping index of 2.28 and with annual grain yields of 1,084.1 jin per mu. In 1978, they farmed a total of 22,151 mu of grain with a multiple cropping index of 2.14 and with annual grain yields of 1,471.5 jin per mu for a 35.7 percent increase. Owing to readjustments in crop rotation, the multiple cropping index dropped by 0.14 as 8,466 mu less of early rice and late crop rice were farmed and 3,571 mu more of late crop rice was formed, thereby staggering farm work and redistributing manpower to make possible a 3 to 6 day advance in the growing of each crop and an improvement in light energy utilization by each crop. In 1978, the early rice crop yielded 688.0 jin per mu for a 12.9 percent increase over 1977. The late rice crop yielded 683.3 jin, a 47.0 percent increase over 1977. In 1978, a total of more than 20,000 mu of rice and wheat were grown in an expansion of double cropping with commensurate reduction in the area of triple cropping. Not only did the single season rice crop throughout the county pioneer per mu yields exceeding 1,000 jin for a 31 percent increase over 1977, but additionally, as a result of the redistribution of manpower and close attention to the seasons for harvesting and planting, the utilization of light and temperature resources was increased with improved annual grain output resulting. In 1978, the suburban multiple cropping index averaged 2.47, a 0.04 reduction from 1977. Reportedly, this also played a role in the redistribution of manpower and in the promotion of large-scale increases in output. From this may be seen that in places with an excessive shortage of manpower, a readjustment to the pattern of crop rotation that serves to reduce the area of triple cropping is helpful in moderating conflicts in the crop seasons and for manpower, and assures continued high and consistent output from grain crops. As for honoring the custom of the masses in the county of growing corn, through appropriate expansion in the three crop system of "wheat-corn-rice," both the light energy utilization may be increased and a synthesis of land use and land nurture can be achieved. In order to meet the needs of the suburbs of large cities for the development of animal fodder, close-in suburbs can also plant some "wheat-corn-rice." Additionally, the counties of Feng, Nan, and Chuan, which are areas of "green manure-two crops of rice," developed its fertilizer resources and went on to give close attention to crop seasons so as to reduce the risk of low temperatures for the late rice crop. Their appropriate expansions in the cultivation of "green manure-two

crops of rice" is also workable. In short, from the angle of fullest use of light and temperature resources, adaptation of methods to local situations for suitable readjustments in current suburban farming systems is mandatory if there are to be further increases in per unit grain yields, and increases in the labor productivity rate and the incomes of commune members. Of course, looked at in terms of long-range objectives, realization of the modernization of agriculture in the suburbs will also increase crop output greatly. The scientific and technical problems entailed are very great, and utilization of light and temperature resources is but a very small subject among them. How can there be full utilization of light and temperature resources? This requires consideration not only of sensible readjustments to the farming system but also requires efforts in breeding and vigorous development of paddy rice varieties that are tolerant of high temperatures, resistant to low temperatures, early ripening, and that have a light energy utilization rate of 3.8 percent. Theoretically, given the light energy in the Shanghai area between 25 May and 4 November, it should be possible to harvest yields of 3,741 jin of rice. The potential for increased yields is great. If only we will launch further study in this quarter and continuously increase the utilization efficiency of light and temperature resources, realization of suburban grain yields of 2,000 jin per mu is entirely possible.

9432
CSO: 4007

PERFORMANCE OF NEW RICE VARIETY REPORTED

Shanghai SHANGHAI NONGYE KEJI [SHANGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 3, 5 Jun 80 p 37

[Article by Mo Chengyu [5459 3397 5148], Jinshan County Seed Company, "Strain of Early Xian Rice, 'Guangxiaozao'"]

[Text] "Guangxiaozao" is a new strain of rice bred at the Songyin Commune Seed Farm in Jinshan County by crossing "Guangluai No 4" with the early xian rice, "Xiao." It has been part of comparative tests of varieties within the county since 1976. During 1978 and 1979 it was part of variety testing in cities in various regions with yields usually amounting to around 780 jin, somewhat more than for early ripening early crop xians, Erjiuaing and Ainanzao No 1. (see table) In 1979 Jinshan County planted 17,200 mu of this hybrid for 746 jin per mu yields, an 8.1 percent increase in output over Erjiulu No 1.

I Growth Characteristics

When cultivated as part of the 3 crop system, the total growth period for Guangxiaozao is about 93 days and it requires 2100 to 2200 degrees of accumulated varying temperatures. It ripens from 2 to 3 days earlier than either Erjiulu No 1 or Ainanzao No 1. It is a specially early ripening early xian. Plant heights are 60 centimeters; plant shapes are bushy; and growth is even. Leaves on the main stem total 10.5 in number. Leaf color is dark green, and leaves are short and straight. Boot leaves are 22.5 centimeters long and 1.51 centimeters wide. The flag leaves grow from the stem at an 18 degree angle and the neck of the panicle is 2.8 centimeters long. Tillering strength is moderate; panicle formation rate is high; plants show both strong tolerance for fertilizer and resistance to lodging. They are subject to light sheath and culm blight. Shapes of panicles are medium; panicles are 15.3 centimeters long; each panicle has 57 grains; seed setting rate is rather high; husks devoid of grain amount to about 17 percent; and the weight of 1000 grains is around 24 grams. Glumes are deep yellow in color, and tips of apicules are yellow and without awns. Grains are short and ovular in shape the chucao [0427 4751] rate is 75.6 percent. Both the fubai [5215 4101] and the xinbai [1800 4101] of grains are large. Grain quality is somewhat poor, and plants are prone to shattering. Plants are strongly temperature sensitive, and there is little give in seedling age. Needs for fertilizer and water are high, and when fertilizer is lacking during the late stage, plants are prone to premature degeneration.

Principal Economic Characteristics of "Guangxiaozao"

(1) 项目		(2) 年份	(3) 全生育期(天)	(4) 株高(厘米)	(5) 总粒数	(6) 空壳率(%)	(7) 千粒重(克)	(8) 有效穗(万/亩)	(9) 产量(斤/亩)
(10)	金山县对比	76	98	54.5	54.9	18.5	26.1	35.4	806
		77	92.2	62.5	54.4	16.7	25.8	37.9	779
		78	88	67.2	63.1	16.7	25.0	33.4	766
		79	96	67.3	65.8	20.4	28.4	38.5	879
(11)	市对比	78	90	60.2	49.9	20.8	22.6	41.7	684
		79	97.1	64.0	55.5	14.4	23.4	43.5	774
(12)	平均		93.6	62.6	57.2	17.1	23.7	38.4	781

Note: Based on compilation of data from municipal and county comparisons. Varieties with which comparisons were made were Erjiuqing and Ainanzao No 1. Average per mu yields 773.3 jin. Total growth period 96.1 days.

Key:

(1) Item
(2) Year
(3) Total growth period (days)
(4) Plant height (cms)
(5) Total number of grains
(6) Empty husk rate (percent)
(7) Per thousand weight of grains (grams)
(8) Effective panicles (10,000 per mu)
(9) Yield (jin per mu)
(10) Jinshan County variety comparisons
(11) Municipal variety comparisons
(12) Average

II Essentials of Cultivation

1. Soil Preparation: The earlier the better. Sowing of seeds between 20 and 24 April for a seedling age of no more than 28 days. Quantity of seeds per mu of seedling fields should be from 170 - 200 jin. Since seeds absorb water fairly slowly, seeds should be soaked a day longer than other varieties.

2. Transplanting Density: There should be 60,000 holes per mu, and from 300,000 to 350,000 basic seedlings. Within 15 days after planting the main stem tillers should amount to about 500,000. There should be between 550,000 and 600,000 at the peak for about 400,000 effective panicles.

3. Basic Fertility of Fields: Each mu should have a dressing of from 25 to 30 dan of pig dung or from 60 to 80 dan of grass-mud rotted manure. From 80 to 100 jin of ammonia water should be applied to the surface. Fertilizer should be applied twice: Between 30 and 35 jin of ammonium sulfate from 2 to 3 days following transplanting. After another interval of 5 to 6 days, another application of ammonium sulfate to promote early development and constant growth. If "Sitting autumn"* occurs when this variety is used as a late rice crop, output will not be as low as from Guangluai No 4.

*[Refers to a transplanting phenomenon where the transplanted seedlings do not grow new leaves or roots while old ones wither. The plant either dies or its growth is retarded 20-40 days.]

9432
CSO: 4007

BRIEFS

AGRICULTURAL RESPONSIBILITY--The propaganda department of Shanghai Municipal Party Committee on the morning of 25 October called a report meeting on various documents adopted by the party Central Committee to strengthen and improve the system of fixed responsibility in agricultural production. Some 10,000 propaganda cadres from party organizations on various fronts heard the reports. (Wang Jingliang), deputy secretary of the leading party group of the Municipal Agriculture Committee, pointed out in his report that the establishment of the system of responsibility in production will further implement the two documents on agricultural development adopted by the party Central Committee, and also play an effective role in perfecting the scientific management of our socialist collective economy. Touching on the question of fixing output quota on a household basis, he pointed out that this is a provisional and flexible measure taken by the party to help some localities with extreme difficulties. [Shanghai City Service in Mandarin 1130 GMT 25 Oct 80 OW]

CHICKEN MANURE AS FEED--Chicken droppings are now being used to feed hogs in 240 livestock farms run by 30 communes in Shanghai suburbs. By mixing it with other types of hog feed, its use can reduce grain consumption by 30 percent. [Beijing RENMIN RIBAO in Chinese 6 Oct 80 p 2]

CSO: 4007

JOINT AGRICULTURE-COMMERCE ENTERPRISE SYSTEM WORKS WELL

Chengdu SICHUAN RIBAO in Chinese 29 Aug 80 p 2

[Article by Shen Gongduo [3163 0180 1122]: Promote Production, Expand Flow of Goods, Increase Income of the Production Team and Commune Members"]

[Text] Since March of this year, the various localities in our province have followed the spirit of the directives of the Provincial CCP Committee. Forty-two areas (communes) in 13 counties have launched testing points for joint management of agricultural sideline products by the supply and marketing cooperatives and production teams. Several months of practice have shown that the joint operation of agriculture and commerce is the correct path. It benefits the promotion of the development of agricultural sideline production, steps up the flow of materials between towns and villages, and increases the income of production teams and farmers.

The fundamental method of joint operations for agricultural sideline products launched by various localities is to rely on a voluntary basis and to do away with the limitations of administrative zones. Supply and marketing cooperatives and production teams negotiate with each other and sign joint agreements. The supply and marketing cooperatives' purchasing stations serve as bases. A joint operations management department is established, and independent accounting is set up to take the responsibility for losses or profits. Representatives of the units participating in the joint operations organize a management committee and practice democratic management. After 20 percent of the profits realized by the joint enterprises are sent in as income tax, 50 percent are returned to the production teams and distributed to participating commune members. Ten percent are given to the local commune for development and for organizing diversification, and 40 percent are given to the supply and marketing cooperatives. This new economic measure has received the support of the broad masses of cadres and commune members. Over 90 percent of the production teams in many counties and regions and some state-run farms and orchards have actively participated in the joint operations.

The test localities for launching joint agricultural and commercial operations have not been in existence for very long. But because of the attention paid to them by the party committees at all levels, the direction is correct, policies and measures suit the actual situation, and their superiority has already been demonstrated. The economic results are obvious. First, the joint ventures have promoted the development of production of agricultural sideline products and expanded the flow of commercial products. According to statistics compiled by the 40 joint operation management departments the monetary amount of agricultural sideline products contracted

with the production teams after joint operations is 30,250,000 yuan, an increase of 11 million yuan, or 57 percent, over that before joint operations. In some areas and communes, this amount has increased by multiples. Second, it has stimulated the enterprises to improve management of operations and has expanded the results of operations. It is estimated that joint agricultural and commercial enterprises operating on a trial basis can realize an increase of 53 percent in profits this year over the actual profits made last year. The Xinghuo area of Yingshan, the Sanyuan area of Fengdu, the Zuyuan area of Jingyan, and the six areas of Hechuan County will double their profits. Third, it increases the income of the production teams. According to estimates made by the 16,146 production teams participating in joint operations, the net income of each team from returned profits and additional sales of products to the purchasing authorities averaged 500 yuan after joint operations. Teams that sold more products to the purchasing authorities received several thousand yuan. Although the state tax rate has been lowered, the amount of tax dollars has increased. It is estimated that this year, a total of 1.2 million yuan can be submitted to the state as income tax, products tax, and industrial and commercial taxes--an increase of 19 percent from the actual amount last year.

The reasons why joint agricultural and commercial operations can achieve such good economic results are mainly the following:

1. Joint operations have linked production and the flow of goods very close together, opened up production and sales channels, and avoided the phenomenon of a break in production and sales. The supply and marketing cooperatives must actively guide the commune brigades to develop production and must exert a lot of effort to help sell agricultural sideline products. In particular, the market for the three categories of agricultural sideline products has been opened up, and future worries of the production teams have been eliminated. The Tashui area of Anxian produced over 1 million jin of ginger this year. This is the type shaped like chicken feet and can only be sold fresh. The production team worried that the ginger could not be entirely sold. The joint operations management department used written communications and made connections everywhere and was able to sell all of the ginger. The masses were satisfied. The joint operations management department of the Yangma Commune of Chongqing County organized two teams to grasp the development of production and the sale of products. Through various channels, over 16,500 pieces of rattan products were sold and over 18,000 jin of wine were sold at negotiated prices for the commune brigade enterprises. By the end of July, 81.7 percent of the annual plan for purchase of agricultural sideline products by the entire commune had been completed--an increase of 20 percent over last year. Many joint operating units have begun to sell fresh produce such as poultry eggs, fresh fish, eels, dogs, and snakes according to the demands of the masses. They have increased the income of the production teams.

2. The relationship between agriculture and commerce has become intimate. In the 1950's, the relationship between agriculture and commerce was very congenial. It was a mutually dependent relationship. Later, due to the influence of the extreme leftist line and problems in work, the relationship between the two became strained and they did not coordinate well. After this attempt to establish test localities for joint agricultural and commercial operations, the benefits of producers and entrepreneurs have been united. A situation in which agriculture and commerce mutually support each other and mutually care about each other has emerged. The cadres of communes and brigades and the masses say: Now, joint operation means "agriculture and commerce working together. Their relationship has greatly improved. There are no more worries that products will not be sold, production has no more after-worries,

the money earned is divided in half, and everyone is happy." They care a lot about the business results of the enterprises. Staff members and workers of the supply and marketing cooperatives also actively help the production teams open up new markets for production and exert efforts to sell the products.

3. Reform of the commerce of farm villages has been advanced. In the past, supply and marketing cooperatives exerted too much centralization and strict management over agricultural sideline products. The basic-level communes were in a passive state, and in management everyone "ate from the big pot." After joint operations, the management department implemented independent accounting and took up the responsibility for profits and losses itself, did away with the limitations of administrative zones, and organized the flow of commercial products according to the direction of flow of economic activities, reduced unnecessary circulation, and saved on circulation costs. After the Xinghuo area of Yingshan County participated in joint operations, products were sold to the purchasing authorities and transferred according to the direction of flow of the economy. The cost saved from just the single product bluish dogbane alone was equivalent to 15 percent of the total amount of last year's profits. Because the joint enterprises "shoulder two tasks" and because they develop cross-sectional channels, the form of operation is versatile, the scope of business is expanded, they actively serve local production and life, and they are praised by the broad ranks of commune members and the masses. The joint operations management department of the Linjiang area of Ziyang County dispatched people to buy back over 380,000 jin of oil dregs from Qingchuan County to support the development of production and went to Qinghai Province to buy back over 620,000 jin of goat manure. The production teams competed to buy them. They signed a contract with Wenjiang area for trumpet creeper vines and vines of peanut plants totaling 340,000 jin. These increased the income of the commune brigades. The joint operations management department of the Singhuo area of Yingshan County took the interest of the masses into consideration, went directly to the Dazu pottery plant and Quxian, bought some pottery products, and sent them to branch communes for sale. Because circulation was reduced, retail prices dropped 13 percent.

At present, joint agricultural and commercial operations are still in the trial stage. Based on the summary of the experiences of the first stage by the various localities, efforts are being exerted to expand the scope of business and the autonomy of the joint enterprises in order to further grasp production well as well as to enliven exchange and strengthen construction of the joint enterprises so as to obtain greater economic results.

9296
CSO: 4007

BRIEFS

AGRICULTURAL FIGURES FOR 1979-- Since 1976 agricultural production in Sichuan has achieved remarkable results. When comparing 1979 with 1976, the total grain output increased 28.8 percent (14.3 billion jin); cotton increased 31.7 percent; edible oil increased 83.3 percent; sugar nearly doubled; silk cocoons, tea leaves and fruit increased 50-100 percent; and live hogs increased nearly 43 percent. The increase in grain output during the past few years has allowed an increase in the grain rations of the commune members. The average per capita grain ration in 1979 for peasants increased 153 jin compared to 1976. In 1976 the income from sideline occupations for commune households for the whole province was 2.4 billion yuan; this increased to 3.4 billion yuan in 1979, accounting for about one-half of the collective distributed income. In 1979 the average amount of fertilizer applied per mu of arable land was 90 jin, more than doubling that applied in 1976. At present the irrigated area in the province accounts for 45 percent of the total amount of arable land. [Hong Kong ZHONGGUO XINWEN in Chinese 8 Oct 80 p 3]

CSO: 4007

BRIEFS

WHEAT SOWING--Urumqi, 24 Oct (XINHUA)--As of mid-October Xinjiang Uygur autonomous region had sown some 8 million mu of winter wheat, or 78 percent of the plan. Aksu and Shihezi prefectures and Bortala Mongol autonomous prefecture had already overfulfilled their respective sowing plans. The state-operated farms in the region had sown a total of more than 2 million mu of winter wheat. [Beijing Xinhua Domestic Service in Chinese 1209 GMT 24 Oct 80 OW]

FINE WOOL--Urumqi, 26 Oct (XINHUA)--Xinjiang Uygur autonomous region increased its fine wool output to more than 22,000 tons this year, accounting for about one-third of the national total. The region is one of China's leading fine-wool producers. It now has 2.38 million head of improved fine-wool sheep, 2,06 million more than in 1972. Over 20 provinces, municipalities and autonomous regions are raising the Xinjiang fine-wool sheep, a breed which won an award at the 1978 National Science Conference. [Text] [Beijing XINHUA in English 0715 GMT 26 Oct 80 OW]

HYDROGEOLOGICAL SURVEY--A certain unit of the PLA capital construction engineering corps stationed in Xinjiang has completed a hydrogeological survey of the 15,000 square kilometer area in southern part of Tarim Basin. The unit started the survey in 1979 to locate underground water. With the active support of the local government and people, the unit has basically grasped the pattern of underground water distribution in the area and discovered abundant underground water existing at the northern foot of Kunlun mountain which can be exploited to irrigate farm land or for use as drinking water. The completion of this survey will contribute to the development of southern Xinjiang. [Urumqi Xinjiang Regional Service in Mandarin 1300 GMT 29 Oct 80 OW]

AIRCRAFT USE IN FARMING--A farm run by the 29th Regiment of the PLA in Bayingolin Monggol Autonomous Zhou of Xinjiang reaped a bumper harvest from its more than 12,000 mu of rice crop sown by aircraft this year. Currently, part of the farm's field work, such as fertilizer application, chemical weeding and spraying of pesticides, is also done by aircraft. [Beijing RENMIN RIBAO in Chinese 16 Oct 80 p 1]

CSO: 4007

BRIEFS

LIVESTOCK BREEDING--There are nearly 400 million mu of pastureland and 7.7 million head of cattle and sheep in Nanqu Prefecture, Xizang. A recently held meeting in Nanqu Prefecture called for still greater efforts to raise livestock and increase animal products side by side so as to improve the living standards of local people. [Lhasa Xizang Regional Service in Mandarin 1100 GMT 19 Oct 80 OW]

CSO: 4007

BRIEFS

BROAD BEAN PRODUCTION--Broad beans are an important grain crop in Yunnan. Normally, an area of approximately 3 million mu is planted with a total of 500-600 million jin per year. This accounts for 25 to 30 percent of the total output of small spring grains. It is planted after the rice crops as well as the corn and cotton crops. [Kunming YUNNAN NONGYE KEJI [YUNNAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 5, 25 Sep 80 p 27]

CSO: 4007

II. PUBLICATIONS

TABLE OF CONTENTS OF 'NONGYE KEJI TONGXUN,' JAN 80

Beijing NONGYE KEJI TONGXUN [AGRICULTURAL SCIENCE AND TECHNOLOGY NEWSLETTER] in Chinese No 1, 15 Jan 80 p 40

[Text] Table of Contents

Front Cover

Wheat Genetics Breeder
Dai Songen [2071 2646 1869] of the Chinese Agricultural Academy of Sciences Is Crossing and Pollinating Monoploid Wheat.....Staff Photo

Cover Two

Experimental Study of Partial Multiploids of Wheat
.....Staff Photo

Cover Three

Batting Wheat in Early Spring Can Prevent Damage by Cold and Increase Yield
Photo by Shen Baichuan [3088 4102 1557]

Back Cover

Small Plastic Pots
Caption Provided by the Soil Fertility Institute of the Chinese Academy of Agricultural Sciences
.....Staff Photo

9296
CSO: 4007

PUBLICATIONS

TABLES OF CONTENTS OF 'SHANGHAI NONGYE KEJI'

Issue No 1

Shanghai SHANGHAI NONGYE KEJI [SHANGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 1, 5 Feb 80 inside front cover

[Text] Table of Contents

Issue No 2

Shanghai SHANGHAI NONGYE KEJI [S''NGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 2, 5 Apr 80 inside front cover

[Text] Table of Contents

Issue No 3

Shanghai SHANGHAI NONGYE KEJI [SHANGHAI AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese No 3, 5 Jun 80 inside front cover

[Text] Table of Contents

I. Epidemiological Survey

9432
CSO: 4007

PUBLICATIONS

TABLE OF CONTENTS OF 'FUJIAN NONGYE KEJI' FEB 80

Fuzhou FUJIAN NONGYE KEJI [FUJIAN AGRICULTURAL SCIENCE AND TECHNOLOGY] in Chinese
No 1, 10 Feb 80 p 64

[Text] Table of Contents

9432
CSO: 4007

PUBLICATIONS

TABLE OF CONTENTS OF 'GUANGDONG NONGYE KEXUE' MAY 80

Gangzhou GUANGDONG NONGYE KEXUE [GUANGDONG AGRICULTURAL SCIENCES] in Chinese
No 3, 8 May 80 p i

[Text] Table of Contents

9296
CSO: 4007

END

END OF FICHE DATE FILMED

Dec. 8 1980

DTM